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1913/14

The University of Minnesota

THE COLLEGE OF AGRICULTURE

1913-1914

BULLETIN OF THE UNIVERSITY OF MINNESOTA
VOL. XVI, NO. 9. JUNE 1913

Entered at the Post Office
in Minneapolis as second-class matter
MINNEAPOLIS, MINN.

UNIVERSITY OF ILLINOIS
OCT 14 1914

PRESIDENT'S OFFICE

The Bulletin of the University of Minnesota is issued by the University of Minnesota as often as twice a month during the university year.

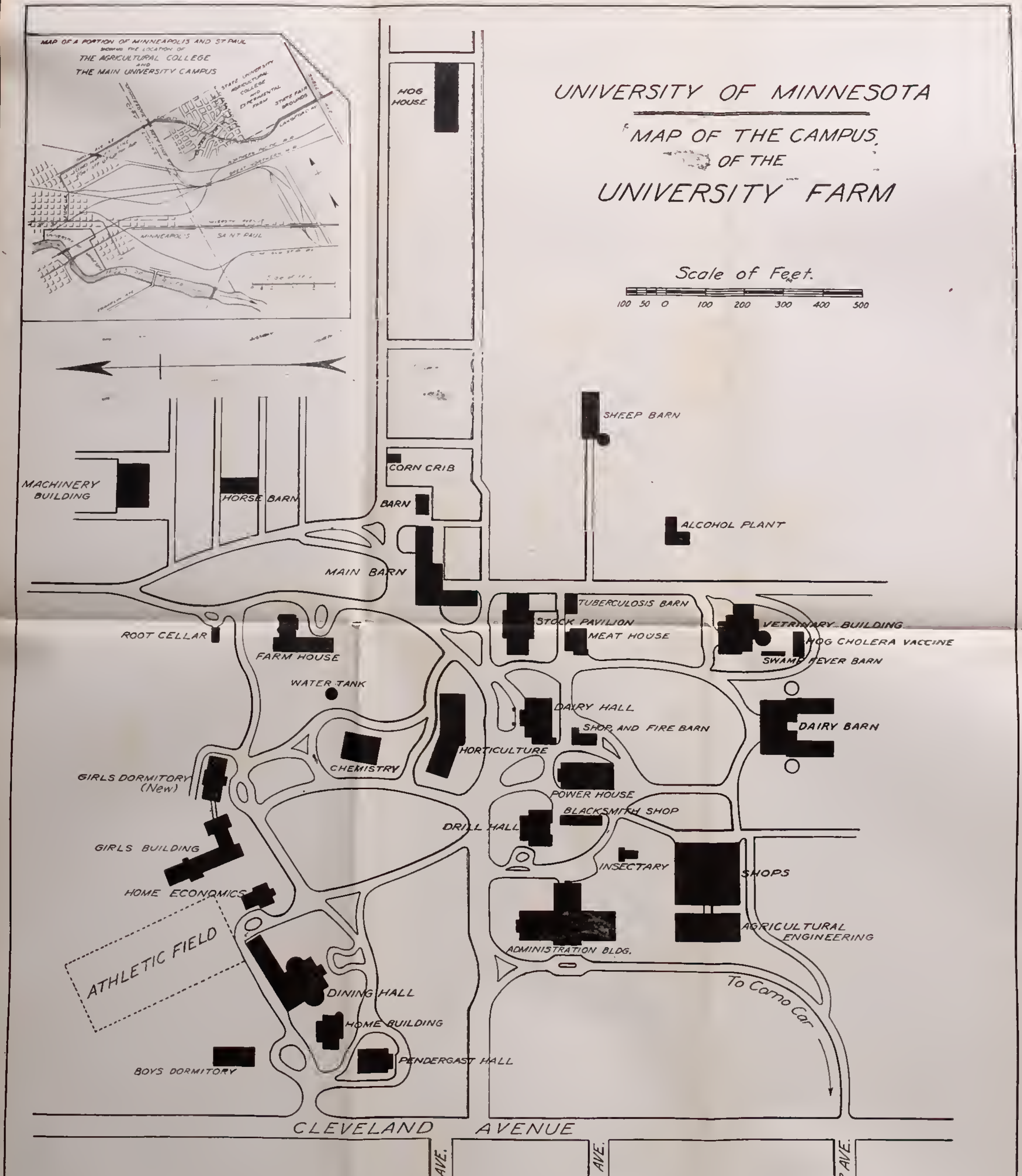
The Bulletin comprises—

Original Series. The President's Report, the Bulletin of General Information, the annual announcements of the schools, colleges, and departments of the University of Minnesota, and other formal publications of the University.

Extra Series. Announcements of departments of instruction, reports of University officers, etc.

Bulletins will be sent gratuitously, postage paid, to all persons who apply for them. In calling for bulletins, the applicant should state whether the Bulletin of General Information is desired or bulletins of certain colleges or schools of the University. Address.

The REGISTRAR,
The University of Minnesota,
Minneapolis, Minnesota.



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1913

JULY

Su	Mo	Tu	W	Th	Fr	Sa
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SEPTEMBER

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NOVEMBER

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DECEMBER

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UNIVERSITY CALENDAR

1913-1914

The University year covers a period of thirty-eight weeks, beginning on the second Tuesday in September. Commencement Day is always the second Thursday in June.

1913			
September	2	Tuesday	Registration closes except for new students
September	2-9	Week	Fees payable except for new students
September	8-15	Week	Examinations for removal of conditions, entrance examinations, registration of new students, and payment of fees
September	10-16	Week	Military encampment of cadets
September	17	Wednesday	First semester begins
Sept. 29-Oct.	4	Week	Second semester condition examinations
November	26	Wednesday	Thanksgiving recess begins 9:00 p.m.
December	1	Monday	Thanksgiving recess ends 8:00 a.m.
December	19	Friday	Christmas vacation begins 9:00 p.m.
1914			
January	6	Tuesday	Christmas vacation ends 8:00 a.m.
January	20	Tuesday	Registration for second semester closes
January	26	Monday	Final examinations begin
January	27	Tuesday	Payment of fees for second semester closes
February	4	Wednesday	Second semester begins
February	12	Thursday	Lincoln's Birthday: a holiday
February	13	Friday	First semester class reports due
April	8	Wednesday	Easter recess begins 9:00 p.m.
April	16	Thursday	Easter recess ends 8:00 a.m.
April	20-25	Week	First semester condition examinations
May	30	Saturday	Decoration Day: a holiday
June	1	Monday	Final examinations begin
June	6	Saturday	Second semester closes
June	7	Sunday	Baccalaureate service
June	8	Monday	Senior class day exercises
June	10	Wednesday	Alumni Day
June	11	Thursday	Forty-second Annual Commencement
June	12	Friday	Summer vacation begins

The University year for 1914-15 will begin Tuesday, September 8.

Entrance examinations for admission to the various colleges of the University will be conducted according to the following schedule, in Room 112, Library Building, unless otherwise specified.

Any student finding a conflict in his program should report to the Registrar for adjustment.

Monday,	Sept. 8	9 a.m.	Business Subjects
		2 p.m.	Manual Subjects, Domestic Art and Science, Agriculture
Tuesday,	Sept. 9	9 a.m.	Astronomy, Botany, Geology, Chemistry, Physiography, Zoology, Physics, Physiology
		2 p.m.	American Government, History, Economics, Commercial Geography, History of Commerce, Economic History of England, Economic History of the United States
Wednesday,	Sept. 10	9 a.m.	English
		2 p.m.	German, Greek, French, Latin, Scandinavian, Spanish
Thursday,	Sept. 11	9 a.m.	Elementary Algebra
		2 p.m.	Higher Algebra
Friday,	Sept. 12	9 a.m.	Plane Geometry
		2 p.m.	Solid Geometry

A representative of each department will be at the office of the head of the department each forenoon of entrance examination week from 9 to 12 to give information and advice.

THE UNIVERSITY

- THE COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS
- THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS
- THE DEPARTMENT OF AGRICULTURE, including—
  - THE COLLEGE OF AGRICULTURE
  - THE COLLEGE OF FORESTRY, including—
    - FOREST EXPERIMENT STATIONS AT ITASCA AND CLOQUET
  - THE CENTRAL SCHOOL OF AGRICULTURE, UNIVERSITY FARM, including—
    - THE DAIRY SCHOOL
    - THE SHORT COURSE FOR FARMERS
    - TEACHERS' SUMMER TRAINING SCHOOL
    - THE SCHOOL OF TRACTION ENGINEERING
  - THE NORTHWEST SCHOOL OF AGRICULTURE, CROOKSTON
  - THE WEST CENTRAL SCHOOL OF AGRICULTURE, MORRIS
  - THE EXPERIMENT STATIONS, including—
    - THE MAIN STATION, ST. ANTHONY PARK
    - THE NORTHWEST EXPERIMENT STATION, CROOKSTON
    - THE NORTH CENTRAL EXPERIMENT STATION, GRAND RAPIDS
    - THE WEST CENTRAL EXPERIMENT STATION, MORRIS
    - THE NORTHEAST DEMONSTRATION FARM AND EXPERIMENT STATION, DULUTH
    - THE SOUTHEAST DEMONSTRATION FARM AND EXPERIMENT STATION, WASECA
    - THE FRUIT BREEDING FARM, ZUMBRA HEIGHTS
  - AGRICULTURAL EXTENSION
- THE LAW SCHOOL
- THE MEDICAL SCHOOL, including—
  - THE SCHOOL FOR NURSES
- THE COLLEGE OF DENTISTRY
- THE COLLEGE OF PHARMACY
- THE SCHOOL OF MINES, including—
  - MINNESOTA SCHOOL OF MINES EXPERIMENT STATION
- THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY
- THE COLLEGE OF EDUCATION
- THE GRADUATE SCHOOL

THE BOARD OF REGENTS

The Hon. John Lind, Minneapolis, President of the Board	1914
George Edgar Vincent, Minneapolis The President of the University	*Ex-Officio*
The Hon. Adolph O. Eberhart, Mankato The Governor of the State	*Ex-Officio*
The Hon. C. G. Schulz, St. Paul The State Superintendent of Public Instruction	*Ex-Officio*
The Hon. John G. Williams, Duluth	1914
The Hon. A. E. Rice, Willmar	1915
The Hon. Charles L. Sommers, St. Paul	1915
The Hon. B. F. Nelson, Minneapolis	1916
The Hon. Pierce Butler, St. Paul	1916
The Hon. Fred B. Snyder, Minneapolis	1916
The Hon. W. J. Mayo, Rochester	1919
The Hon. Milton M. Williams, Little Falls	1919

EXECUTIVE OFFICERS

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George H. Hayes, University Comptroller and Secretary of the Board of Regents

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Francis C. Shenehon, C.E., Dean of the College of Engineering and the Mechanic Arts

Albert F. Woods, M.A., Dean and Director of the Department of Agriculture

Edward M. Freeman, Ph.D., Assistant Dean of the Department of Agriculture

William R. Vance, Ph.D., LL.B., Dean of the Law School

Frank Fairchild Wesbrook, M.A., M.D., C.M., Dean of the Medical School

Alfred Owre, B.A., M.D., C.M., D.M.D., Dean of the College of Dentistry

Frederick J. Wulling, Ph.G., LL.M., Dean of the College of Pharmacy

William R. Appleby, M.A., Dean of the School of Mines

George B. Frankforter, M.A., Ph.D., Dean ot the School of Chemistry

George F. James, Ph.D., Dean of the College of Education

Guy Stanton Ford, Ph.D., Dean of the Graduate School

Margaret Sweeney, Ph.D., Dean of Women

THE COLLEGE OF AGRICULTURE

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1827 4th St. S. E., Minneapolis

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JOSEPHINE T. BERRY, M.A., Professor of Nutrition

FREDERICK J. ALWAY, Ph.D., Professor of Soil Chemistry

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2089 Carter Ave., St. Paul

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*Marion Weller, Textiles
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Clyde H. Bailey, Agricultural Chemistry
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---

*Term of service begins August 1, 1914.

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Louis E. Willey, D.V.M., Veterinary Science
2089 Carter Ave., St. Paul
Grace I. Williams, B.S., Foods and Cookery

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John H. Allison, Ph.B., M.F., Professor of Forestry
2116 Carter Ave., St. Paul
John P. Wentling, M.A., Associate Professor of Forestry
2160 Carter Ave., St. Paul

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*Frederic E. Clements, Ph.D., Professor of Botany
800 4th St. S. E., Minneapolis
Rene M. Delamare, B.L., Instructor in French
501 8th Ave. S. E., Minneapolis
William H. Emmons, Ph.D., Professor of Geology
The Leamington, Minneapolis
Leon Metzinger, Ph.B., Instructor in German
979 14th Ave. S. E., Minneapolis
Henry F. Nachtrieb, B.S., Professor of Animal Biology
905 6th St. S. E., Minneapolis
Norman Wilde, Ph.D., Professor of Philosophy and Psychology
901 6th St. S. E., Minneapolis
Anthony Zeleny, Ph.D., Professor of Physics
613 Fulton St. S. E., Minneapolis

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George B. Frankforter, M.A., Ph.D., Professor of Chemistry
525 E. River Road, Minneapolis

FROM COLLEGE OF EDUCATION

George F. James, Ph.D., Professor of Education
316 10th Ave. S. E., Minneapolis

FACULTY COMMITTEES

1913-1914

Executive Committee.—Dean and Chiefs of Divisions
College Council.—Chiefs of Divisions and Sections

---

*Absent on leave 1913-14.

Enrollment and Program.—STEWART, STORM, MOWRY, HOWARD, CADY

Curriculum and Catalogue.—Executive Committee

Students' Work.—FREEMAN, WEST, ROE, RUGGLES, Miss BERRY, and Miss SWEENEY

Military.—WOOLNOUGH, WENTLING, PATERSON

Library.—MAYNE, REYNOLDS, LANSING, WALKER, DORSEY, and Miss SEWALL

Student Organizations.—F. L. WASHBURN, LANSING, STAKMAN, and Miss DENNY

Graduate.—HAECKER, STEWART, RUGGLES, H. R. SMITH, F. L. WASHBURN

Athletics.—CHEYNEY, MOWRY, OSWALD, MONTGOMERY

Demonstration and Exhibit.—C. P. BULL, FRAZIER, WILSON, R. M. WASHBURN, A. C. SMITH

Sanitation.—REYNOLDS, MAYNE, Mrs. BOUTELLE, LIPP, A. M. BULL, and Miss PEARCE

Grounds.—BOSS, CADY, STEWART

Rules and Records.—WEST, MOWRY, DREW

Publications.—WILSON, HAECKER, BOSS, DORSEY

Auditing Committee.—ROE, ARNY, LANSING

Registrar.—JAMES M. DREW

Secretary of Faculty.—EDWARD M. FREEMAN

ENROLLMENT

INSTRUCTIONS TO PROSPECTIVE STUDENTS

Students who are not graduates of accredited schools, and those graduates who have conditions as specified in the paragraphs under *Admission to Freshmen Class by Certificate,* should report in time to take the entrance examinations in such subjects as may be required. The examinations are given only on the dates scheduled on page vi.

New students should report in time to have their registration completed and to enter classes on the date scheduled for the beginning of the semester, as new students can not enter classes after Saturday of the first week.

Graduates of accredited schools should read carefully the conditions under which high-school work can be accepted for entrance without examination.

Credentials.—All students upon entering this College for the first time shall submit their credentials to the Enrollment Committee.

ADMISSION TO FRESHMAN CLASS—ALL APPLICANTS

Admission is either by certificate (p. 8) or by examination (p. 9).

The term *unit* means not less than five recitations of forty minutes each per week for a period of thirty-six weeks. In manual subjects and kindred courses it means the equivalent of ten recitation periods per week for thirty-six weeks.

(a) *Number of credits required.*—No candidate will be admitted with less than fifteen units of the required grade. The Enrollment Committee may, however, authorize substitutions in the list of required subjects to the extent of one unit, in case the candidate did not have an opportunity to take all the required subjects.

(b) *Character of credits required.*—Candidates must present:

(1) Four years of English, or three years of English accompanied by four years of one foreign language.

(2) A major series of three or more units and a minor series of two units, each series chosen from one of the admission groups, B, C, D, E. Either the major or the minor series must be in Mathematics, and both shall not be in the same group. To form a language series, at least two units of the same language must be offered.

(3) Enough additional work to make in all fifteen units, of which not more than four may be in Group F.

Prospective students in Agriculture are urged to present both Higher Algebra and Physics for entrance. This will permit the selection of vocational electives during the college course in place of Mathematics and Physics otherwise required.

(c) *Admission Groups*—

Group A: English

English, four or three units
- (a) Principles of rhetoric
- (b) Practice in written expression in each of the years of the course on an average of not less than one hour a week
- (c) Classics

Group B: Foreign Languages

Latin—
- Grammar, one unit
- Caesar, four books, one unit
- Cicero, six orations, one unit
- Virgil, six books, one unit

Greek—
- Grammar, one unit
- Anabasis, four books, one unit

German—
- Grammar, one unit
- Literature, one, two, or three units

French—
- Grammar, one unit
- Literature, one, two, or three units

Spanish—
- Grammar, one unit
- Literature, one, two, or three units

Scandinavian Languages—
- Grammar, one unit
- Literature, one, two, or three units

Group C: History and Social Sciences

History—
- Ancient, to Charlemagne, one unit
- Modern, from Charlemagne, one unit
- English, one-half unit
- Senior American, one-half unit

American Government, one-half or one unit

Elementary Economics, one-half unit

Commercial Geography, one-half or one unit

History of Commerce, one-half or one unit

Economic History of England, one-half unit

Economic History of the United States, one-half unit

Group D: Mathematics

Elementary Algebra, one unit

Plane Geometry, one unit

Higher Algebra, one-half unit

Solid Geometry, one-half unit

Trigonometry, one-half unit

Group E: Natural Sciences

Physics, one unit

Chemistry, one unit

Botany, one-half or one unit

Zoology, one-half or one unit

Physiology, one-half unit

Astronomy, one-half unit

Geology, one-half unit

Physiography, one-half unit

Group F: Vocational Subjects

Not to exceed four units may be offered from the following list of vocational subjects.

Business Subjects—
- Business Law, one-half unit
- Business Arithmetic, one-half unit
- Elementary Bookkeeping, one unit
- Advanced Bookkeeping, one unit
- Stenography and Typewriting, two units

Manual Subjects—
- Freehand Drawing, two units
- Mechanical Drawing, two units
- Shop Work, two units
- Modeling and Wood Carving, one unit

Domestic Art and Science, four units

Normal Training Subjects—

One to three units from schools giving Normal Courses approved by the State High School Board, provided the applicant has had one year of subsequent teaching experience.

Agriculture—

One to four units from schools receiving special state aid for Agriculture and also from other schools in which such course in Agriculture is approved by the State High School Board, as fast as the said schools are prepared to offer work in Agriculture.

Description of Subjects Accepted for Admission

A description of subjects accepted for admission to the University may be found in the Bulletin of General Information, a copy of which will be sent to any address upon application to the Registrar, University of Minnesota, Minneapolis.

ADMISSION TO FRESHMAN CLASS—BY CERTIFICATE

(a) General.—Certificates from the College Entrance Examination Board and from the State High School Board are accepted as satisfying the scholarship requirement.

(b) From Minnesota State High Schools or other accredited schools.—Graduates of a four-year course of a Minnesota State High School or other accredited school in Minnesota, provided they meet the general requirements stated above, and the following special requirements as to grades.

(1) The applicant for admission must present to the Enrollment Committee the principal's certificate containing his record on all the studies which were counted toward graduation. All records shall be entered on this certificate as *passed*, *passed with credit*, or *passed with honor*.*

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*In per cent these three grades are to be interpreted approximately as follows:

(1) In schools having 65 as a passing mark, passed equals 65-75, passed with credit equals 75-90, passed with honor equals 90-100.

(2) In schools having 70 as a passing mark, passed equals 70-78, passed with credit equals 78-90, passed with honor equals 90-100.

(3) In schools having 75 as a passing mark, passed equals 75-80, passed with credit equals 80-90, passed with honor equals 90-100.

To facilitate the operation of this rule, each accredited school is expected to keep its record of standings in these three grades or else show by a printed statement in the record book and in the catalogue of the school, how the marks in use are to be translated into these grades.

(2) Candidates for admission on certificate must have an average record in the subjects counted for admission of *pass with credit.* For the purpose of this average a *pass* is offset by a *pass with honor.* Candidates are therefore admitted provided thay have at least as many semester marks of *pass with honor* as they have semester marks of *pass.*

Candidates entering on certificate shall not be examined for admission on subjects which are lacking or below the required grade, except on presentation to the Enrollment Committee of satisfactory evidence that they have done adequate special work in preparation for the examination. A certificate from the principal of the last school attended, or other person approved by the Enrollment Committee, shall constitute satisfactory evidence; and adequate special preparation shall consist of not less than thirty 60-minute hours under competent instruction on each semester subject presented for examination. (See (d) below.)

(3) *List of Accredited Schools.*—A list of accredited schools, including state high schools and private schools, may be found in the Bulletin of General Information, a copy of which will be sent to any address upon application to the Registrar, University of Minnesota, Minneapolis.

(c) Graduates of the Advanced Latin and Advanced English courses of the Minnesota State Normal Schools.

(d) Graduates of a four-year course of a school in any other state which is accredited to the state university of that state, provided such candidates satisfy all the requirements as to major and minor series, subjects, and grades demanded of the graduates of Minnesota high schools. (See (b) (2) above.)

(e) Graduates of the Schools of Agriculture* who have a grade of 75 per cent in all subjects and can present additional credits as follows:

(1) Before September, 1913:

The subjects prescribed in the Intermediate Course or fourth year provided no subject has a grade lower than 75 per cent.

(2) After and including September, 1913:

English, two years, in advance of that taken in the three-year course of the School of Agriculture.

Mathematics, two years, selected from Group D.

History, one or two years, selected from Group C.

Two or three years each chosen from Groups B, C, D, or E, making a total of eight years.

No credit will be given for any subject in Group F outside of the work done in the School of Agriculture.

Completion of the above work must be certified by an accredited high school or covered by examination as specified in *Entrance by Examination.*

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*Includes West Central School at Morris Northwest School at Crookston, and Central School at University Farm, St. Paul.

ADMISSION TO FRESHMAN CLASS—BY EXAMINATION

(a) *General.*—Entrance examinations are offered at the University during the opening week of the University year. (Cf. schedule on p. vi.) Candidates must pass examinations in all subjects specified above, except such as may be covered by College Entrance Examination Board or State High School Board certificates.

(b) *Candidates from Other States.*—In case the records of any candidate from another state can not be translated into the grades used in this State, the Enrollment Committee shall order examinations in English and also in three other subjects chosen from three different admission groups. The results of such examinations shall be final.

(c) The examinations authorized under *Admission to Freshman Class by Certificate* (b) (2) shall be held at the same time and according to the same schedule as the regular entrance examinations mentioned under (a) above.

ADMISSION TO ADVANCED STANDING

1. *All Applicants.*—(a) No new student will be admitted to the work of the second semester unless he brings from another college a certificate of advanced standing, showing his qualifications to continue the second semester's work.

(b) Students who desire to obtain advanced standing must, within six weeks after the beginning of the semester, present their applications and certificates to the Enrollment Committee, who will consult departments concerned in determining the credit to be given. Applications presented after the six weeks have expired will be rejected or $5.00 charged for the transfer made.

2. *By Transfer from Other Universities or Colleges.*—(a) Applicants transferring from other universities or colleges must furnish a certificate showing that they have no entrance conditions and are honorably dismissed.

(b) The College accepts records from other colleges for credit to advanced standing. Such records are accepted so far as they are equivalent to the work done in this College, subject to the approval of the divisions concerned. In bringing certificates from other institutions, the records must be on the official blank of the institution granting the certificates, and should show:

(1) The subject studied and ground covered.

(2) The time spent upon each subject.

(3) In the case of laboratory subjects a concise statement of the work done.

(4) *The result.* It is sufficient to state that the subject was creditably completed.

(c) Graduates of the Advanced Graduate Course of a Minnesota State Normal School are admitted, and may substitute for college work such normal work as will be approved by the Enrollment Committee after consulting with the divisions concerned.

(d) Individual graduates of the Advanced Latin Course (five years) or of the Advanced English Course (five years) of a Minnesota State Normal School, who, on the basis of maturity and ability, present certificates of special fitness from the President of the normal school will be admitted with advanced standing under the same regulations and proviso.

3. *By examination.*—(a) Any student upon first registration at the University, may, with the approval of the Enrollment Committee, be allowed without charge to take examinations toward advanced standing for which the student declares himself ready, such examinations to be taken within the first six weeks of the college year. (Cf. *Administration* B 3.)

(b) Students who desire advanced standing on subjects taken in accredited schools, and not used for entrance credits will be required to take an examination.

(c) Students desiring credit for practical work must present a detailed statement showing the nature of the work done, and should give reference letters and recommendations, and take an examination.

ADMINISTRATION

A. REGISTRATION

Note.—All new students must make appointment for a physical examination at the Armory, Minneapolis Campus, before they will be permitted to register.

1. *Defined.*—Registration shall consist of (a) filing with the Registrar the prescribed blank, properly filled out, i. e.

(1) Indicating the course to be pursued, and the week's program.

(2) Containing such departmental and committee approvals as the Registrar may require.

(b) Payment of fees, and

(c) Return of receipt to the Registrar.

2. *Time for.*—(a) Registration must be indicated two weeks before the day set for classes to begin. The registration as defined above must be complete before the day set for classes to begin. Penalty for delay in either indicating or completing registration, one dollar, and after the day set for classes to begin, an additional twenty-five cents will be charged for each day's delay. Fines for delayed registration will be considered a part of the regular fees for the semester. Note that failure to comply with both of the above requirements will result in a two-dollar fine and fifty cents additional daily.

(b) No student will be allowed to register after the semester opens except by permission of the Faculty.

(c) Cf. 13 (d) below.

3. *Quantity of Work.*—(a) No student shall be permitted to register in any course for more than the regular schedule, nor for less than fifteen credit hours in any one semester, without permission of the Students' Work Committee.

(b) Application for work in excess of the prescribed course shall be granted by the Committee only when the applicant has a record for good scholarship in all lines of his work for the previous semester.

(c) Cf. 13 below and C 5 and 6.

4. *Preferred Classes.*—When the same course is offered both at the University Farm and in the departments located on the Minneapolis Campus, students must register for the classes at the University Farm unless they are otherwise permitted by the Students' Work Committee.

5. *Electives.*—(a) Not later than May 1, each sophomore in the General Agricultural Course shall indicate to the Registrar the division in which he expects to specialize. This selection must be approved by the Chief of the Division concerned. After selecting a division in which to specialize, no change shall be made except by permission of the Students' Work Committee.

(b) The elective studies designated as General may be chosen from the work offered in the College of Science, Literature, and the Arts, the

Law School, the Medical School, and the College of Engineering, except (1) that no student shall count toward his degree more than six credits in any of the last three named colleges, and (2) that the selection shall be subject to such other restrictions as may be imposed by the Students' Work Committee. The elective studies designated as Agricultural are to be selected from courses offered at this College.

6. *Evidence of.*—The class card is the only evidence of registration to be accepted by any instructor. No student shall be admitted to class after the first week unless his card is in the possession of the instructor.

7. *Credit according to.*—(a) Students shall not receive credit for work for which they have not been registered, except as otherwise provided in these regulations.

(b) Cf. *Admission with Advanced Standing* and B 3 (f).

8. *Change of.*—(a) The Registrar has authority to grant change of registration from one subject to another any time up to and including Saturday of the first week of the semester without charge.

(b) Cf. 14 (h) below.

9. *Suspension of.* Cf. B 2 (c).

10. *Cancellation of.*—(a) Any student leaving the College before the end of a semester should request the cancellation of his registration. Each instructor will then send to the Registrar a report of such student's work up to the date of leaving. Reports of work below passing will be entered on the records as *failed.*

(b) Cf. C 1, 2, and 4.

11. *Refusal of.* Cf. C 3 and 5.

12. *Re-registration.* Cf. C 6 and 9.

13. *Classification of Students.*—(a) In order to rank with a class, a student must have not more than three credits short of the number required in the outline of the course.

(b) Unclassed students must take the same number of hours as regular students, and, unless advanced standing is obtained through credits from other institutions or by examination, twelve credit hours during the first year must be taken from the subjects offered to freshmen. The Committee on Enrollment may allow exceptions in cases of persons of mature age, upon recommendation of the division concerned. A new application must be made each semester to the Enrollment Committee.

(c) Unclassed students shall not be admitted to the work of either semester after Saturday of the fourth week.

14. *Fees.*—(a) *Incidental:* All students who are residents of the State of Minnesota are charged an incidental fee of fifteen dollars a semester. Non-residents are charged double the fee required of residents of the State, or thirty dollars a semester. Cancellation of registration after Saturday of the second week of any semester, up to and including Saturday of the ninth week, will entail a return of a pro-rated portion of the semester fee. After the latter date no deduction shall be made for leaving before the end of the semester.

(b) *Deposit.*—Students are required to deposit five dollars which will be credited to them in settlement of their accounts. Additional deposits of five dollars may be required by the Cashier at any time that the student's account shows no balance.

All new students registering for Military Drill will be required to make a deposit of fifteen dollars to cover the cost of the prescribed uniform.

(c) *Nurse.*—Students have the privilege of taking nurse cards at one dollar each semester. These cards entitle the holder to office consultation and office treatment by regular nurses.

(d) *Post-Office.*—Each student is required to obtain a post-office box at the University Farm. Fifty cents will be deducted from the five-dollar deposit as rental.

(e) *Condition Examination.* Cf. C 8.

(f) *Special Examination.* Cf. B 3.

(g) *Fines.* Cf. 2 above.

(h) *Change of Registration.*—After Saturday of the first week of any semester no change of registration shall be made except by permission of the Students' Work Committee and on payment of two dollars and fifty cents change of registration fee. This fee will not be charged when the change is ordered by the Students' Work Committee, required by conflict, or consists only in cancellation.

B. CONTROL OF CLASSES

1. *Daily Routine.*—The daily session is divided into recitation periods of forty-five minutes each. The morning session begins at 8:00 and closes at 12:25. From 11:40 to 12:25 o'clock on Wednesday is reserved for a general assembly of the Faculty and students of the College of Agriculture, and, once each month, for an all-University Convocation meeting. The afternoon session begins at 2:00 and continues until 5:25 o'clock. Work extends through six days of the week, Saturday afternoon excepted.

2. *Absences.*—(a) Tardiness and absences shall be controlled by the divisions on the general principle that each student must do the full work of the class.

(b) Any student whose absences in any semester exceed four weeks in the aggregate shall be refused admission to the final examinations and reported as *failed* unless special permission for the examination be obtained from the Faculty.

(c) When a student has been absent six times consecutively, the instructor shall notify the Registrar that the student has ceased to attend class. The Registrar shall then notify the Chairman of the Students' Work Committee and all instructors concerned that the student's registration has been suspended. Such student will be reinstated only on an order of the Students' Work Committee.

(d) *Leave of Absence.*—Any student intending to absent himself from college during any part of the college year must obtain a leave of absence from the Committee on Students' Work.

3. *Examinations and Reports.*—(a) Regular written examinations shall be held at the close of each semester in all classes in the freshman and sophomore years.

(b) All classes in the senior and junior years shall be examined at the close of each semester, either orally or in writing as the professor may direct; provided that in the special subjects requiring course examinations the regular semester examinations may be omitted with the approval of the Dean, in which case the time assigned for examinations shall be given to some form of recitation or instruction.

(c) The presentation of notebook or theme shall not be accepted in lieu of examinations.

(d) Cf. 2 (b) above.

(e) No examination shall be given by any instructor except for the work of the current semester, unless the student surrenders a permit for such examination signed by the Registrar. This permit must be returned to the Registrar with the record of the examination.

(f) *Examination for Credit.*—Students who have made up work by themselves may, by permission of the Committee on Students' Work, obtain credit for the same through examinations, on payment of five dollars, special examination fee. Cf. also *Admission with Advanced Standing—By Examination.*

(g) *Condition Examinations.* Cf. C 8.

(h) *Special Examinations.*—The Registrar will issue permits for special examinations on orders from the Students' Work Committee and the Cashier's receipt for payment of five dollars.

(i) *Cheating.*—In all cases of cheating in examinations or written exercises, the offender may be reported to the Students' Work Committee for such action as the case may require.

C. DELINQUENTS

1. *Warned of Delinquency.*—Any student of the freshman class who has been warned that he is deficient in sixty per cent of his work at the end of the first eight weeks of either semester and whose work is similarly deficient at the end of the first twelve weeks, shall be immediately dropped from the rolls. He may be reinstated on probation by the Students' Work Committee subject to further action by the Faculty.

2. *Probation.*—Any student who has been placed on probation by the Students' Work or Enrollment Committees may be dropped from the rolls by the Students' Work Committee at any time when one-half of his work is reported below grade.

3. *Registration Refused.*—Each division shall report to the Registrar two weeks before the end of the semester the names of any students pursuing any continuous course of study who have been doing such poor work as to make it impracticable for them to do the work of the following semester and such students shall be refused registration for said course.

4. *Registration Cancelled.*—It is provided, also, that in case the final examination shows any student, who has not been previously reported, to be incapable of further pursuing the subject in a satisfactory manner, at the written request of the head of the division concerned, the Registrar shall cancel the student's registration for that subject.

5. *Dropped from the Rolls.*—Any student receiving conditions or failures in sixty per cent of his work in any semester shall be dropped from the rolls and shall not be allowed to re-enter the University until the opening of the corresponding semester of the following year, and will be allowed to pursue at that time only those subjects in which he previously failed. Exception may be made by the Committee on Students' Work.

6. *Pursue Work Again.*—(a) Any student of the freshman class who fails to pass in one-half the prescribed work of the year shall be allowed on re-entering the University to register for not more than fifteen credit hours each semester, except that he may be permitted by the Students' Work Committee to repeat all courses in which he was previously delinquent.

(b) Any student receiving a failure in any subject shall be required to re-register for this subject the following corresponding semester in preference to any advanced work, unless excused by the Committee on Students' work.

7. *Incompletes.*—(a) When a student's work in a subject is, in the main, satisfactory, but incomplete, owing to absence from class, or failure to do on time a certain definite portion of the work which is only a small part of the entire work, and the reason for such absence or failure is satisfactory to the instructor, the work shall be reported as incomplete.

(b) An incomplete not removed on or before Saturday of the fourth week of the following semester becomes a condition. The Committee on Students' Work may, in special cases, extend this time limit.

(c) Cf. 11 (b) below.

8. *Conditions.*—(a) A condition not made up before the subject is offered again becomes a failure, subject to the rules governing failures.

(b) Students conditioned in the work of the first semester are given an opportunity to remove their condition in April. Students conditioned in the work of the second semester are given an opportunity to remove their condition in October. All condition examinations must be taken at the dates regularly set by the program for such examinations and at no other time.

(c) The Registrar will issue permits for condition examinations on receipt of the Cashier's receipt for the payment of one dollar, examination fee, provided that the student has taken no previous examination for the removal of this condition, and provided the condition is of not more than one semester's standing.

9. *Failures.*—(a) Failures must be taken over in class.

(b) Cf. 6 above.

10. *Eligibility Regulation.*—No student in this College with any condition or failure standing against him shall be eligible:

(a) As a competitor in intercollegiate debate, oratory, athletic or judging contests.

(b) For membership on the editorial board of any student publication.

(c) For membership in the Dramatic Club or in any student dramatic or musical organization which gives entertainments outside the University.

11. *Special Rules Governing Seniors.*—(a) *Excused from Examinations:* All seniors who have received no conditions or failures since the close of the freshman year shall be excused from their last semester final examinations in all subjects in which their work and attendance have been satisfactory to the instructor concerned.

(b) *Second Semester Registration:* No student shall be considered eligible for graduation whose conditions and other deficiencies are not completely removed by May first.

D. REQUIREMENTS FOR GRADUATION AND DEGREES

1. *Number of Credits.*—After the completion of the prescribed course of study, including all of the required work and the requisite amount of elective work equivalent to a total of 144 credit hours for the Agricultural Course and of 136 credit hours for the Home Economics Course, candidates will be recommended for graduation with the degree of Bachelor of Science.

Six months' practical farm experience is required of each candidate for graduation from the Course in Agriculture. See statement under Divisions and Equipment (p. 22) and Courses of Study (p. 29).

2. *Exempted from.*—Every student shall do the work of the class with which he graduates, except that the student shall be free from any additional requirements for any year of which he has already completed the full work without condition.

3. *Delinquencies.*—No person shall be permitted to graduate who has an incomplete, condition, or failure standing upon the books of the Registrar.

4. *Professional Certificates.*—Diplomas of graduates of the College who have taken specified educational courses are valid as first-grade professional certificates for two years, and at the expiration of two years of successful teaching, such diplomas, properly endorsed, have the force of first-grade professional certificates for life. For specified courses, see page 32 and page 33.

E. MISCELLANEOUS

1. *Faculty Meetings.*—The Faculty meets regularly at 4:00 p.m. on the second Monday of each month of the college year.

2. *Petitions.*—(a) Every petition to be acted upon at any particular meeting of the Faculty must be presented to the Dean and Secretary of the Faculty not later than forty-eight hours previous to the time set for such meeting.

(b) Every student who desires to be heard in regard to his petition shall be given such an opportunity by the Committee or Faculty.

3. *Excused from Drill.*—In military matters where persons ask to be excused from Military Drill, the matter shall go first to the Commandant.

If he approves, the Committee on Students' Work may take such action as they please. If he does not approve, and the Committee does approve, the matter shall go to the President of the University for final decision.

4. *Disturbances.*—Class meetings are held to be solely for the class calling the said meeting, and in case of disturbance and damage to property those who are known to be present and not members of the class, shall be held responsible for the damage done even though it may be shown that they did not do the actual damage.

5. *Class Parties.*—No class party or public entertainment held on the campus or for which members of the class shall be held bound in honor to contribute shall be given without previous permission of the Committee on Student Organizations.

6. *Student Organizations.*—All student organizations making use of any of the college buildings must file a statement with the Registrar, giving the names of president, secretary, and treasurer; and all organizations collecting fees must deposit the fees with the department cashier and turn in their books at least once a semester to be audited by the Auditing Committee. Any group of students intending to form a new organization should first consult with the Chairman of the Committee on Student Organizations.

GENERAL INFORMATION

GRADUATE WORK AND DEGREES

Special facilities are offered to graduate students from this and other colleges who wish to become familiar with methods employed in experiment station work, and to pursue further their collegiate studies. Courses for major and minor subjects may be arranged by consulting the professors in the different divisions. Students who enter for advanced degrees register with the Graduate Committee of the College of Agriculture, and also in the Graduate School. They must take their major subjects in the College of Agriculture, but they may take one or both of their two minor subjects in the College of Science, Literature, and the Arts or in the College of Engineering and the Mechanic Arts. Graduate students registered in the Graduate School may take one or both of their minor subjects in the College of Agriculture.

1. The degree of Master of Science will be conferred on a Bachelor of this or any other college of equal grade who, not sooner than one year after graduation, if a resident graduate student at this Agricultural College, shall pass an examination in certain prescribed lines of study and present a satisfactory thesis in accordance with the requirements of the Graduate School.

2. All general regulations of the Graduate School governing candidates for the Master's degree, method of selecting work, amount of work required, degree of proficiency expected, and the time and manner of conducting the examinations, apply to candidates for Master's degrees in the College of Agriculture.

3. The degree of Doctor of Philosophy will be conferred by the Graduate School for study in the College of Agriculture on Bachelors of this or any other college of equal grade within not less than three years after graduation therefrom under conditions prescribed by the Faculty of the Graduate School.

SCHOLARSHIPS AND PRIZES

It is the policy of the University to establish scholarships in the different departments where extra help is needed for instruction under regulations somewhat as follows:

(1) The appointments are made by the Executive Committee of the Board of Regents upon the recommendation of the department in which the appointment is desired, after approval by the Faculty.

(2) Recipients of scholarships may be either graduate or undergraduate students.

(3) The scholarships are not intended as gifts or as benefactions from the State to the recipients, but as provisions under which services may be rendered the University.

(4) It is understood that these services are of a nature which shall assist the holder of a scholarship to attain the mastery of some line of work in the department in which he is appointed.

Gideon Memorial Fund

In honor of Peter M. Gideon, the pioneer in developing new fruit and the originator of the Wealthy apple, the Minnesota State Horticultural Society has raised a fund of five hundred dollars, which has been placed with the Board of Regents for investment. The income from this fund is to be expended by the Professor of Horticulture of the University of Minnesota for prize essays on some suitable horticultural subject. This prize money will be awarded at the close of each year.

The Shevlin Fellowships

The late Thomas H. Shevlin, of Minneapolis, conveyed to the Regents of the University on May 17, 1910, $40,000 of five per cent bonds for fellowships. The Regents have in accordance with the wishes of the donor established four graduate fellowships under the jurisdiction of the Graduate School to be awarded as follows: One in Medicine, one in Chemistry, one in Agriculture, and one in Liberal Arts, each being the income of $10,000, and yielding $500 each per annum. They are awarded annually.

Before appointment as fellow can take effect the applicant must have completed the course for the Bachelor's degree.

Candidates for these fellowships will file their applications before May 1, with the Dean of the Graduate School, stating their previous education and attainments and the graduate work they desire to enter upon, and give suitable references.

ORGANIZATIONS

Philomathian Literary Society is an organization of the students of the College of Agriculture, its object being to train its members in the art of public speaking, debating, and parliamentary practice. The society is coeducational and its membership is limited to forty. Meetings occur weekly, and programs, including readings, recitations, debates, and speeches, are presented. Visitors are welcome.

Athenian Literary Society is an organization of the College of Agriculture having for its object the training of its members along the lines of public speaking and debate. The society is coeducational. Its membership is limited to fifty. A program is presented each Tuesday evening, and visitors are welcome.

The Agricultural Club is an organization of the men of the College of Agriculture. The membership is unlimited. Regular meetings are held bi-monthly. The object of the club is to keep its members up-to-date along lines of general interest; first, by providing speakers of recognized ability; second, by provoking timely discussion. Especially are those subjects discussed upon which very little literature is available. The social side is not overlooked.

The Dairy Club is an organization of students especially interested in the subjects of dairying. Already a large and enthusiastic membership has been drawn from College and School. Meetings occur fortnightly and give the students a much-needed opportunity to thresh out for themselves the theories of the classroom. The evenings are occupied by talks and debates. Enthusiasm is the only requirement for admission.

The Home Economics League is an organization of the women of the College of Agriculture. The membership is unlimited. The object of the association is to keep its members up-to-date on home economics movements throughout the country, as well as to give organized backing to any movement for the betterment of the College. It is the ambition of the association to have a building of its own in the very near future.

Alpha Zeta.—Alpha Zeta is a professional fraternity, electing its members from the upper classmen of the Colleges of Agriculture and Forestry. Scholarship attainments and endorsement by the members of the Faculty are essential qualifications for membership. The objects of the fraternity are the advancement of agricultural interests, co-operation, and mutual help among its members, aiming toward fitting them for leadership in agricultural development.

Students' Council.—The Students' Council has for its object the promotion of the best interests of the University and, in particular, the unification and advancement of student interests in the Department of Agriculture. It is a representative body elected each year from the upper classmen in Agriculture, Forestry, and Home Economics. The Council assumes general charge of student activities, such as the freshman reception, freshman-sophomore field day, boat ride, and the Country Fair, and may act for the whole student body in matters affecting all of the students.

LIBRARY

The Agricultural Library is well equipped for supplying the needs of both undergraduate and graduate students. It contains more than 19,000 volumes of general and technical literature, government reports, etc., besides 50,000 unbound pamphlets, bulletins, and reports. The general subject and author card index and the index of publications of the State Experiment Stations are always at the disposal of students to aid them in locating the various sources of information which the library affords.

There are complete sets of all standard encyclopeadias and dictionaries and files of over 300 popular and technical magazines and periodicals.

The Librarian and her assistants are always ready and glad to give whatever assistance they can, both to those interested in special research work and to those doing regular reference work in connection with their classes. All those wishing to read or study are made welcome and given whatever privileges the library can provide.

DIVISIONS AND EQUIPMENT

The courses in Agriculture are designed to give the student a broad education in the sciences and arts relating to agriculture and to fit him for the work of an agricultural specialist. The physical and biological sciences are made prominent. The work in these subjects is begun in the first or second year and may be continued throughout the course. For the first two years the lines of study are prescribed, the subjects being chosen with a view of giving a good foundation for the work which follows. For the last two years some elective work is offered, giving the student an opportunity to take work along certain lines for which he has a special aptitude and liking.

Six months' practical farm experience is required of each candidate for graduation. It is expected that the work be done on some accredited farm on which improved methods and appliances are in use. This work can be performed during the summer vacations under the guidance of the head of the division in which the student is specializing.

AGRONOMY AND FARM MANAGEMENT

Collections of classes and varieties of farm crops are provided for class use in Agronomy. Special attention is given to studying the nature and structure of seeds and their behavior in germination. Charts and models are used so far as possible, and an attempt is made to give the student an opportunity to get the results of experiments in crop breeding and growing which are conducted at University Farm. A Grain-Judging Laboratory is provided. Visits to the State Grain Inspection Department and to elevators and mills adjoining the Twin Cities furnish additional opportunities for studying seeds and grains and for learning the customary methods of grain merchandizing.

For Farm Management work there is available the data on the cost of production for ten years from numerous farms in the State. Farm Management Survey Records and Demonstration Farm Records are also available for use in giving laboratory work to students and in presenting the various phases of Farm Management. Original research is encouraged both in Agronomy and in Farm Management, and the library provides standard references upon these subjects.

AGRICULTURAL CHEMISTRY AND SOILS

Equipment.—A special laboratory with modern apparatus for the analysis of foods and agricultural products is provided. The equipment contains a Berthelot-Atwater calorimeter for the determination of the caloric value of foods, vacuum ovens, apparatus for the chemical and microscopical analysis of foods, and the necessary facilities for human and animal food investigations. Special facilities are offered in testing wheat, flour, and cereal products for commercial purposes. Nutrition investigations, including the digestibility of foods, the chemical changes which take place in cooking, and the losses in the preparation of foods, form a part of the Experiment Station work. This offers an opportunity for students to study methods of investigation relating to human food problems. Laboratory practice is also offered to advanced students in the study of household problems in which chemistry is involved and investigation of special problems in Agricultural Chemistry. Special facilities are offered for the study of the organic matter of the soil and its influence upon the chemical and physical properties of soils. The laboratory is provided with apparatus for the physical and chemical analysis of soils and for the study of special problems in relation to soil fertility. The library contains many of the standard periodicals and reference books upon soils and fertilizers. As soil investigations and a study of the soil areas of the State form a feature of the Experiment Station work, opportunity is offered for practical experience in the study of soil problems in relation to crop production.

AGRICULTURAL EDUCATION

One of the greatest movements in modern education is the introduction of industrial work into the institutions of public education. In the Middle West its most marked expression is the teaching of Agriculture, Home Economics, and Manual Training in public high schools, normal, consolidated, and rural schools. All America is active in the movement, but Minnesota with her broad, far-reaching plans, financial aid and state organization is prepared to lead the van. In only one important factor has she been hampered—no adequate provision has existed for the proper preparation for teachers of these subjects in the schools. To meet this defect in the state system this Division of Agricultural Education has been created in the College of Agriculture.

To young men who wish to teach Agriculture and to young women who wish to teach Home Economics this department offers the professional preparation to equip them for their work. It also advises and counsels with those actively engaged in teaching, and in other ways seeks to promote the proper presentation and administration of these subjects as factors in public education.

In addition to the courses in subject matter which are taken in the regular college classes of those subjects, courses are given in the principles, process, and practices of teaching these subjects, accompanied by practice teaching in regular classes under expert criticism.

The selection of material in all the courses, both those in subject-matter and those in method, has been made with the definite intent of giving the student a broad preparation in the fundamentals of all the important subjects rather than a narrow specialization in any one.

The demand for persons so prepared and of good teaching ability is far in excess of the supply, at annual salaries of from $600 to $800 for women and $900 to $1,600 for men of no or very limited experience; while the salaries for those of maturity and successful teaching experience range from $800 to $1,800 for women and $1,200 to $3,000 for men. There is a strong unfulfilled demand for men of superior personality, farm experience, normal or college preparation, public school teaching experience, and scientific agricultural training at very high salaries.

With the large field for study and observation offered by the numerous state-aided schools and with the opportunity for practice work in the St. Anthony Park training school, the regular high schools, the short courses, and the extension work, Minnesota has conveniences for those contemplating preparation for this work possessed by few or no other American institutions. When the large demand within the State for the graduates from these courses is added, it completes a cycle of educational conditions mutually promising to the student and the State.

AGRICULTURAL ENGINEERING

This division includes the work in Mathematics, Physics, Drawing, Shop Practice, and the general principles of Engineering Mechanics and Frame Construction as they apply to Agriculture, the object being to combine in each course such engineering features as will enable the student to perform the more simple engineering operations which will occur in the work of his chosen course, and will further prepare him to understand the principles underlying the more complicated problems of engineering and thus enable him properly to interpret plans and specifications and to carry on investigations in connection with engineers.

The division is fairly well supplied with apparatus, instruments, charts, and photographs for properly demonstrating the work.

DAIRY AND ANIMAL HUSBANDRY

A. ANIMAL HUSBANDRY

Equipment.—Representatives of some of the leading breeds of cattle, sheep, and swine are kept at University Farm, and herds of blooded stock near the institution and the annual show of live stock at the State Fair serve for extended observation of breeds and methods of management. Each year a number of experiments are under way in the feeding of these classes of animals. Breeding experiments are also undertaken with sheep and swine, and theoretical experiments with the smaller animals. Experiments in summer-feeding cattle, sheep, and swine wholly or in part on pasture are carried on each year. The Live Stock Building affords excellent accommodations for class work in stock judging.

B. ANIMAL NUTRITION

The economic relation of foods to the kinds and character of energy expended by the animal body is a subject of vital importance to live stock owners. It is a subject which has received no small amount of time in experiment work from the Dairy Division of this institution. The facilities in the way of laboratory equipment, as well as numerous animals for experiment purposes, are adequate for giving students a thorough scientific training in this subject. The dairy herd and some sixty head of nutrition steers are constantly kept for investigation work. Great stress is laid on chemical, biological, and physical phenomena affecting these problems, and to this end a thorough training in this science is given.

C. DAIRY HUSBANDRY

Equipment.—Students in the college course have the advantages of the equipment of the Dairy School. The feeding and breeding experiment in the Dairy Division of the Experiment Station serves a most useful purpose in the collegiate instruction. The cordial relations existing between the Department of Agriculture and other state institutions are often advantageous to college students well advanced in dairy work.

Specimens of several breeds of cattle are kept for class use. Herds in the vicinity and those shown at the State Fair are useful to students in this course.

This course is designed to meet the needs of those desiring a thorough knowledge of dairying. It will equip graduates for responsible positions as managers of large butter and cheese factories, stock farms, or for positions as instructors in dairy schools. Applicants must have had at least four weeks' experience in a creamery or cheese factory and may substitute this for Dairy and Animal Husbandry Course 29.

D. POULTRY HUSBANDRY

The equipment consists of three laying houses with a capacity of about 400 fowls, ten colony houses of different dimensions and designs, incubators representing six leading makes, about twenty brooders of standard makes. New and enlarged equipment of the latest and most practical designs are about to be added which will double this capacity. Representatives of several of the most popular utility breeds are kept. This equipment affords the students practice in the management of flocks, incubating, brooding, etc.

ENTOMOLOGY

Equipment.—Well-lighted laboratories with modern equipment are at the disposal of college students for both undergraduate and graduate work. Instruction is further aided by an excellent series of charts and lantern slides. The department is well equipped with museum specimens convenient to the lecture room, showing not only a large series of insects, injurious and otherwise, over 10,000 specimens, but also birds and other animals which have a direct bearing upon agriculture. A good museum is also a valuable auxiliary in instruction, and friends of the institution are urged to contribute specimens which illustrate the animal resources of the State. Excellent facilities for installing and caring for specimens are offered.

In economic work the student is brought into direct contact with spraying apparatus and insecticides. Practical work in bee-keeping is offered in our apiary, and experiments in insect life can be carried on by advanced students in the insectary at nearly all seasons of the year.

A course in Insects and Diseases is offered in view ot the fact that of late years various insects or insect-like animals have been found to play a very important and hitherto unrealized part as carriers and transmitters of disease, and thus have a very important bearing upon the health of man.

Arrangements have been made with the Department of Animal Biology by which Agricultural students will be enabled to get elementary instruction in Entomology in the course known as Zoology 1, preparatory to work in the Agricultural College.

HOME ECONOMICS

The work in Home Economics offered in the College of Agriculture is a four-year course leading to the degree of Bachelor of Science. It is intended to bring to the vocation of home-making the same kind of help which the course in Agriculture brings to the business of farming. Aside from the universal need of education of this character, there is a marked and increasing demand for trained women to fill institutional and administrative positions as competent supervisors of supplies and of hygiene, where large numbers are cared for in collective housekeeping, as well as for special teachers in the several divisions of Home Economics.

HORTICULTURE

Equipment.—The work in the Division of Horticulture is mainly carried on at University Farm. About twenty acres is here used for the field work in this line. The Horticulture Building furnishes excellent facilities for classroom and laboratory exercises. The special work in breeding and testing fruits is carried on at Zumbra Heights, Carver County, where eighty acres of land are devoted to this purpose and equipped with suitable greenhouse, storage cellar, barns, etc., affording excellent facilities for this line of investigation.

The campus of the Department of Agriculture is planted out with a collection of trees, shrubs, and herbaceous plants suitable for this section, the specimens of which are labeled with their common and botanical names. The parks, greenhouses, orchards, and nurseries of the near vicinity afford convenient and satistactory illustrations of the best commercial methods and ornamental planting. Our facilities in this line are unexcelled, perhaps, by any other college in the country.

The greenhouses, laboratories, and classrooms of the Division of Horticulture are well equipped with modern apparatus. The division library contains a large number of horticultural works and is further supplemented by a card index to all its literature.

MILITARY SCIENCE

All male students are required to take three hours' drill per week for two years. An encampment is held each fall and those attending are excused from two-thirds of the work of the first semester which follows. Officers are selected from those who have completed the two years of required drill, the lieutenants from the junior, and the captains from the senior class. A cadet grey uniform is worn for which a deposit of fifteen dollars is required.

Instruction is given in Drill Regulations, Manual of Guard Duty, Firing Regulations, and Field Service Regulations. A course in Military Science is held for two hours per week during the second semester. There is a gallery range for indoor shooting, and range practice is held at Fort Snelling during the encampment. Manoeuvres are held each year with the St. Thomas cadets during the visit of the War Department Inspector. Another manoeuvre is held with a regiment of the Minnesota National Guard.

Besides the benefit to the student from learning the rudiments of Military Drill he receives the benefits of the physical, mental, and moral training such as are bound to result from proper military training. It is impressed upon the student that he as an individual is benefitted by this work. Confidence in self and manliness are two traits which a knowledge of military life is bound to develop.

VEGETABLE PATHOLOGY AND BOTANY

Equipment.—The work of this division is designed to assist the student in correlating the fundamental facts and theories of Botany and the practical problems of agricultural and horticultural work. The laboratories, library, and demonstration material are arranged and equipped to enable the student to accomplish this correlation. The greenhouse and the abundant opportunities for observing plant life on the grounds and Station farm furnish further facilities. The plant and seed collections, including especially the plant diseases, are made useful to the student. A special field for plant-disease and weed investigation is maintained on the Station farm. Problems of agricultural botany and plant-disease work and examination of seeds and seed mixtures are features of the division.

Special courses in applied botany are provided to prepare graduates for special work along the following lines: diseases of plants on the farm and in the forest, the botanical study of farm plants, and the examination of seeds and seed mixtures. Graduates will be prepared for investigational work in Experiment Stations, Federal Departments of Agriculture, commercial seed-testing laboratories, and as instructors in applied botany or related subjects.

VETERINARY SCIENCE

Equipment.—The Veterinary Building gives ample facilities for good work. The hospital furnishes cases for study and demonstration, and the dissecting room affords material and opportunity for studying the digestive organs, anatomy of conformation and type, and locomotor apparatus. A large and well-stocked museum contains ample material for illustration.

Instruction is given by text-books, lectures, collateral reading, and by practice work. The lectures are illustrated by means of stereopticon, skeletons, manikins, charts, and by the living animal. Anatomy of locomotion, conformation, the digestive organs, and the higher physiology of digestion are given prominence.

Infectious diseases of domestic animals are studied with reference to causes, recognition, prevention, and methods of control. Certain medicines which the intelligent stockman should understand are studied with reference to uses and methods of administration.

COURSES OF STUDY

COURSES IN GENERAL AGRICULTURE

Students are especially urged to read *carefully* the following general instructions and to refer to them frequently during the college course.

Six months' practical farm experience is required of each candidate for graduation in all courses in Agriculture. At some time during the freshman year students should consult the chiefs of the divisions in which they intend to specialize in regard to this requirement. This experience should be obtained before entering upon the junior year.

Students are urged to decide *as early as possible* in what line of work they intend to specialize, and to consult with the Faculty of the Division in regard to all matters pertaining to their future work, such as electives, farm experience, and the possibilities for preparing especially for distinct fields of work.

The following lines of specialization are offered:

Agronomy or Farm Management
Dairy and Animal Husbandry
Horticulture
Plant Pathology (graduate work advised)
Entomology (graduate work advised)
Agricultural Education

All students should note carefully the following provisions for electives in the first three years. When the line of specialization has been chosen, the required electives for the student intending to specialize in these lines are as follows:

For Agronomy or Farm Management—

Sophomore year: Elective, both semesters, Botany 2; junior year: Agricultural elective, first semester, Agronomy 3.

For Dairy and Animal Husbandry—

Sophomore year: Elective, both semesters, and junior year for Entomology 2 or Vegetable Pathology 1 (but not both), any courses in Dairy and Animal Husbandry.

For Horticulture—

Sophomore year: Elective, both semesters, Botany 2; junior year: for Dairy and Animal Husbandry 14, Horticulture 4 and Forestry 10.

For Plant Pathology—

Sophomore year: Elective, both semesters, Botany 2; junior year: for Dairy and Animal Husbandry 14, Organic Chemistry; for Agricultural elective, first semester, and General elective, second semester, Botany 3.

For Entomology—

Sophomore year: Elective, both semesters, Botany 2 or Entomology electives; junior year: for Dairy and Animal Husbandry 14, Horticulture 1 and 2.

For Agricultural Education—

(For requirements for Teacher's Certificate, see senior year.) Sophomore year: Elective, first semester, Rhetoric 4; elective, second semester, Dairy and Animal Husbandry 4; junior year: first semester, Agricultural elective and for Dairy and Animal Husbandry 14, two of the following: Agronomy 2, Agronomy 3, Dairy and Animal Husbandry 8; second semester, General elective, Agricultural Engineering 18.

FRESHMAN YEAR

First Semester

*German 1 or French 1 (3)
or
Econ. 3a, Indust. Hist. of Europe (3)
Botany 1. General (3)
Rhetoric 1, General (3)
†Agr. Eng. 1, Math. 1a (3)
or
‡Dy. and An. Husb. 1, Live Stock (3)
Agr. 1, Agronomy (3)
Chem. 2, General (3)
Military Drill

Second Semester

*German 1 or French 1 (3)
or
Econ. 3b, Indust. Hist. of U. S. (3)
Botany 1, General (3)
Rhetoric 1, General (3)
Agr. Eng. 2a, Math. 2a (3)
Dy. and An. Husb. 26, Elements of Dairy Husbandry (3)
Chem. 3, Qualitative (3)
Military Drill

SOPHOMORE YEAR

First Semester

Elementary Physics (3)
or
††Elective (3)
**German 2 or French 2 (3)
or
Agr. Educ. 1, Principles of Education (3)
Rhet. 2, Argumentation (3)
Dy. and An. Husb. 1, Live Stock (3)
or
**Elective (3)
Zoology 1, General (3)
Agr. Eng. 4, Mechanical Drawing (3)
Military Drill

Second Semester

Elementary Physics (3)
or
††Elective (3)
*German 2 or French 2 (3)
or
Agr. Educ. 2, Industrial Education (3)
Rhet. 2, Argumentation (3)
Hort. 10, General (3)
Zoology 1, General (3)
Agr. Chem. 1, Plant and Animal Life (3)
Military Drill

JUNIOR YEAR

First Semester

‡‡Agr. Elective (3)
Econ. 1, Elements (3)
‡‡Ent. 2, Economic Entomology (3)
‡‡Dy. and An. Husb. 14, Animal Nutrition (3)
‡‡Veg. Path. 1, Plant Pathology (3)
Agr. Chem. 14, Soils (3)

Second Semester

‡‡General Elective (3)
Econ. 22, Rural Economics (3)
Agr. Eng. 11, Agr. Physics (3)
Vet. 1, Veterinary Work (3)
Agr. Eng. 12, Farm Engineering (3)
Agr. Chem. 15, Soil Fertility (3)

*Or any other modern language, provided a program can be arranged. A student electing a language must complete the second year's work in the language elected.

†For those who do not present Higher Algebra for entrance.

‡For those who present Higher Algebra for entrance.

**For those who have taken Dy. and An. Husb. 1 in the freshman year.

††For those who present Physics for entrance. See also general instructions above for rules governing electives.

‡‡See above for general instructions for electives and substitutions in different lines of specialization.

SENIOR YEAR IN AGRONOMY OR FARM MANAGEMENT

First Semester

Agr. 11, Farm Management (3)
Agr. 4, Thremmatology (3)
or
Elective (for Farm Management Students) (3)
Agr. Eng. 9, Farm Structures (3)
Agricultural Elective (3)
Elective (3)
Dy. and An. Husb. 17, Dairy Stock Feeding and Management (3)

Second Semester

Agr. 7, Farm Management (3)
Agr. 12, Grain and Corn Judging (3)
Agr. 5, Plant Breeding (3)
or
Econ. Elective (for Farm Management Students) (3)
Agronomy or Farm Management Elective (3)
Veg. Path. 3, Agricultural Botany (3)
Dy. and An. Husb. 7, Live Stock Feeding and Management (3)

SENIOR YEAR IN DAIRY AND ANIMAL HUSBANDRY

First Semester

Zool. 4, General Physiology (3)
Dy. and An. Husb. 17, Dairy Stock Feeding and Management (3)
Dy. and An. Husb. 5, Stock Judging (3)
Agr. Eng. 9, Farm Structures (3)
Dy. and An. Husb. 2, Poultry (3)
or
Dy. and An. Husb. 19, Factory Management (3)
or
Dy. and An. Husb. 21, Cheese Making (3)
General Elective (3)

Second Semester

Zool. 4, General Physiology (3)
Dy. and An. Husb. 7, Live Stock Feeding and Management (3)
Agr. 7, Farm Management (3)
Dy. and An. Husb. 6, Animal Breeding (3)
Vet. 2, Anatomy of Digestion (1½)
Vet. 3, Physiology of Nutrition (1½)
Dy. and An. Husb. 20, Factory Butter Making (3)
or
General Elective (3)

SENIOR YEAR IN HORTICULTURE

First Semester

General Elective (3)
Agr. 4, Thremmatology (3)
Hort. 6, Landscape Gardening (3)
Hort. 8, Systematic Pomology (3)
General Elective (3)
Hort. 1, Commercial Fruit Growing (3)

Second Semester

Hort. 7, Plant Breeding (3)
Hort. 5, Floriculture (3)
Academic Elective (3)
Hort. 2, Market Gardening (3)
Hort. 9, Spraying Materials and Comps. (1½)
Hort. 11, Greenhouse Construction (1½)
General Elective (3)

SENIOR YEAR IN PLANT PATHOLOGY

First Semester

Veg. Path. 4, Adv. Plant Pathology (3)
Agr. 11, Farm Management (3)
Entomology Elective (3)
Botanical Elective (3)
General Electives (6)

Second Semester

Veg. Path. 4, Adv. Plant Pathology (3)
Horticulture Elective (3)
Entomology Elective (3)
Botanical Elective (3)
General Electives (6)

Students specializing in Plant Pathology can not expect to be properly prepared without at least one year of graduate work. The general electives should include one year of Physics (if not taken in the Sophomore year) and one year in Physical and Physiological Chemistry.

SENIOR YEAR IN ENTOMOLOGY

First Semester

Chem. 9, Organic Chemistry (3)
Entomology Elective (3)
Veg. Path. 4, Adv. Plant Pathology (3)
Ent. 11, Systematic Entomology (3)
Electives (6)

Second Semester

Chem. 9, Organic Chemistry (3)
Entomology Elective (3)
Veg. Path. 4, Adv. Plant Pathology (3)
Entomology 11, Systematic Entomology (3)
Electives (6)

Students specializing in Entomology can not expect to be properly prepared without at least one year of graduate work.

SENIOR YEAR IN AGRICULTURAL EDUCATION

First Semester

Agr. Eng. 9, Farm Structures (3)
Dy. and An. Husb. 17, Dairy Stock Feeding and Management (3)
Dy. and An. Husb. 2, Poultry (3)
Agr. Educ. 4, Organization and Management (3)
or
Agr. Educ. 6, Practice Teaching (3)
Agr. Educ. 5, Methods (3)
*Elective (3)

Second Semester

Agr. 7, Farm Management (3)
Agr. 12, Grain and Corn Judging (3)
Veg. Path. 3, Agricultural Botany (3)
Dy. and An. Husb. 7, Live Stock Feeding and Management (3)
Vet. 5, Common Diseases (1½)
Hort. 9, Spraying Materials (1½)
Agr. Educ. 4, Organization and Management (3)
or
Agr. Educ. 6, Practice Teaching (3)

Courses for Teachers and Supervisors of Agriculture

Students expecting to teach should take the following courses. The completion of the first four courses, together with any two of the last three, will, upon graduation, entitle the person to a first-grade professional teachers' certificate.

Agr. Educ. 1, Principles of Education (3)
Agr. Educ. 2, Industrial Education (3)
Educ. 1, History of Education (3)
Psychology 1b, Elements of Psychology (3)
Agr. Educ. 4, Organization and Management (3)
Agr. Educ. 5, Methods (3)
Agr. Educ. 6, Practice Teaching (3)

COURSE IN HOME ECONOMICS

Students intending to teach or supervise courses in Home Economics may obtain a teacher's certificate in accordance with the announcement in *Courses for Teachers and Supervisors of Home Economics*, given on page 33.

FRESHMAN YEAR

First Semester

*German 1 or French 1 (3)
or
Econ. 3a, Indust. Hist. of Europe (3)
Botany 1a, Elementary (3)
Rhetoric 1, General (3)
Chem. 2, General (3)
Home Econ. 55, Drawing and Design (5)
†Hygiene
†Survey Talks on Home Economics

Second Semester

*German 1 or French 1 (3)
or
Econ. 3b, Indust. Hist. of U. S. (3)
Zool. 19, Elementary (3)
Rhetoric 1, General (3)
Chem. 3, Qualitative (3)
‡Home Econ. 2, Sewing and Garment Making (3)
Home Econ. 4, Textiles and Textile Economics (2)

*Students should take the remaining elective shown under junior year.

**Spanish or any other modern language may be substituted for German, provided a program can be arranged. A student electing a language must complete the second year's work in the language elected.

†All freshmen in the Home Economics Course will be required to attend a course of lectures on Hygiene and also a course of general talks on aims and methods in Home Economics.

‡Students offering accepted Domestic Art or Domestic Science for entrance may choose an elective.

SOPHOMORE YEAR

First Semester

*German 2 or French 2 (3)
or
Elective (3)
Rhetoric 2, Argumentation (3)
Sociology 1 or 2 (3)
Agr. Chem. 5a, Quantitative (2)
‡Home Econ. 21, Foods and Cookery (3)
General Physiology (3)

Second Semester

*German 2 or French 2 (3)
or
Elective (3)
Rhetoric 5, English (3)
Veg. Path. 8, Bacteriology (3)
Organic Chemistry Lectures (3)
Home Econ. 22, Food Economics (3)
Home Econ. 52, Laundry Methods and Management (1)
Home Econ. 54, Home Care of the Sick (1)

JUNIOR YEAR

First Semester

Home Econ. 41, Nutrition I (5)
Home Econ. 3, Dressmaking (3)
Home Econ. 5, Decorative Needle Work (2)
Econ. 1, Elements (3)
Educ. 1, History of Education (3)
Elective (1)

Second Semester

Home Econ. 42, Nutrition II (5)
Agr. Eng. 10a, Household Mechanics (3)
Psychology 1b, Elements (3)
Electives (6)

SENIOR YEAR

First Semester

Educational Electives (5)
Home Econ. 7, Costume Design and Construction (3)
*Home Econ. 43, Research Problems in Nutrition (5)
Electives (4)

Second Semester

Home Econ. 44, Dietetics (3)
Home Econ. 6, House Furnishing (3)
Home Econ. 58 The Family (3)
Home Econ. 60, Position of Women (2)
Electives (6)

SUGGESTED ELECTIVES

Education
History of Art
History of Architecture

Arts and Crafts
History
English

Courses for Teachers and Supervisors of Home Economics

The completion of the first two courses, together with any three of the last five, will, upon graduation, entitle the person to a first-grade professional teachers' certificate.

Educ. 1, History of Education (3)
Psychology 1b, Elements of Psychology (3)
Agr. Educ. 1, Principles of Education (3)
Agr. Educ. 2, Industrial Education (3)
Agr. Educ. 11, Methods in Home Economics (3)
Agr. Educ. 12, Organization and Management (3)
Agr. Educ. 13, Practice Teaching (3)

*Not offered in 1913-1914.

DESCRIPTION OF COURSES

AGRONOMY AND FARM MANAGEMENT

Andrew Boss, Professor of Agronomy and Farm Management and Chief of Division 21 1st fl. Main Bldg.
Coates P. Bull, B.Agr., Associate Professor of Agronomy 23 1st fl. Main Bldg.
Louis B. Bassett, Assistant Professor of Farm Management 18 1st fl. Main Bldg.
Albert C. Arny, B.S. in Agr., Assistant Professor of Agronomy 21 1st fl. Main Bldg.
Francis W. Peck, B.S. in Agr., Instructor in Farm Management 20 1st fl. Main Bldg.

1. Agronomy Mr. Arny

Three credits (six hours per week); first semester. Required of freshmen in Agricultural Courses.

A study of the principles and effects of crop rotation, supplemented by the working out of rotations suited to different farms and types of farming; the value, care, and use of barnyard manures; bacteria as related to soil fertility; weeds in relation to crop production and farm profits; plant selection and breeding methods; seed selection; the use and care of meadows and pastures; the planting, cultivating, harvesting, storing, and marketing of field crops. A thesis on some suitable agronomic subject will be required.

2. Farm Machinery Mr. Bassett

Three credits (six hours per week); first semester. Elective. Open to juniors and seniors.

Practical suggestions and practice work are given in connection with the best methods of adjustment, handling, and adaptation of the various kinds of machinery to the soils, weeds, and seasons. Durability and convenience in manipulation are chief among the points considered.

3. Farm Crops Mr. Arny

Three credits (six hours per week); first semester. Required in the junior year for those specializing in Agronomy or Farm Management; also for juniors or seniors in Agricultural Education. Prerequisites, Bot. 1, Agr. 1.

A study in detail of entire, representative plants of the various cereal, forage root, fibre, and miscellaneous crops. The identification of the seeds of these crops and the classification and value of good seed are emphasized. Attention is given to the subjects of meadows, pastures, and soiling crops and to the production and preservation of all kinds of cured, forage, and ensilaged crops.

4. Thremmatology Mr. Bull

Three credits (three hours per week); first semester. Required of seniors specializing in Agronomy. Prerequisites, Bot. 1, Zool. 1. Given in alternate years. 1914-15.

Heredity, variation, laws of breeding, the art of breeding, improvement by nature and under scientific experimentation, securing foundation stocks, value of using very large numbers, immense value of the occasional individual which can transmit qualities of peculiar value, use of an ideal, use and misuse of the score card, both numerical and graphic, intrinsic qualities, fancy points and distinguishing marks, statistical methods in breeding pedigree records of efficiency, fundamental principles underlying the arrangement of the record books, bibliography and terminology, study of the literature of breeding.

5. Plant Breeding Mr. Bull

Three credits (three hours per week); second semester. Required of seniors specializing in Agronomy. Prerequisites, Bot. 1, Agr. 4. Given in alternate years., 1913-14.

Botany of the reproductive organs of field crops, field crop nursery management, producing new qualities by hybridizing and by change of environment, hybridizing versus cross-breeding, in-breeding and self-fertilization, originating varieties and improving standard varieties by selection and by hybridizing, followed by selection, methods of disseminating new varieties, seed and plant introduction, experimentation in the theories relating to heredity, variation, and practical breeding, and the breeding of each of the various field crops grown in Minnesota.

7. Farm Management Mr. Boss

Three credits (three hours per week); second semester. Required of seniors specializing in Agronomy or Farm Management. Prerequisite, Agr. 11.

This course is offered with a view to emphasizing the business side of farming. It includes the choice of farms; the comparison of types of farming; the adjustment of crops to location, markets, and live stock; the systematic arrangement of crops in rotation; the effect of cropping systems on soil productivity and crop yields; the regular employment of capital, and the employment and distribution of labor. Special attention is given to the reorganization of farm plans. Each student is required to draft a plan of a farm in which he is interested where some specialized type of farming is followed; to submit a business statement of the fixed and operating capital employed, together with the cost of operation, the revenue, and the net profit.

9. Agronomy Mr. Arny

Three credits (three hours per week); second semester. Elective in Home Economics Course. Open to seniors.

A study of the principles governing the science of agriculture and their relation to farm life; a brief study of the origin, formation, and cultivation of soils; the movement and control of soil moisture; the conservation of soil fertility by systematic rotation and the use of fertilizers; bacteria in their relation to soil fertility; methods in plant improvement. The larger part of the time given to this subject will be devoted to a study of the cereal, sugar, and fiber crops from the standpoint of producer and consumer. Special consideration will be given to the crops and their by-products that are largely used for human food. The course is intended to give such an insight into farming as a business and into farm life that those taking it may be better able to lend their influence toward bringing about healthful ideas and surroundings for life in the country.

11. Farm Management Mr. Peck

Three credits (six hours per week); first semester. Required of seniors specializing in Agronomy or Farm Management.

A course of lectures combined with text-book and practical work in the science of accounting and in kindred subjects, designed especially for students expecting to become farm managers, farm superintendents, or farm management field men. Consideration is given to the various forms of commercial paper, the relation of credit institutions to the farm and to business methods in common practice. Emphasis is laid upon methods of cost keeping and the drawing up of yearly statements which show the condition of the farm business.

12. Grain and Corn Judging Mr. Arny

Three credits (four hours per week); second semester. Required of seniors specializing in Agronomy or Farm Management. Prerequisites, Bot. 1 and 2, and Agr. 1.

A history and study in detail of representative samples of the leading varieties of grain, corn, and grass seeds, together with the adaptation of each to different localities; the conditions affecting the yield and market value; the uses to which grains and corn are put. Score card practice and comparative judging of grain, corn, and grass seed is a prominent feature of this work.

13. Plant Breeding Mr. Bull

Six credits (minimum). Open to graduate students who have had two years in Botany, Agr. 1, or equivalents. Thremmatology and Cytology are required, but may be taken as extra work during the course.

14. Special Agronomic Problems Mr. Bull

Six credits (minimum). Open to graduate students who have had two years in Botany, Agr. 1 and 2, or equivalents. The choice of subjects will be left primarily with the candidate; but it must be approved by the Chief of the Division and by the Committee in charge of graduate work.

15. Advanced Farm Management Mr. Boss

Six credits (minimum). Open to graduate students who have had Agr. 1, Elementary Economics, Agr. 6, or equivalent, Agr. 7.

16. Farm Management Surveys Mr. Boss

Credits, six hours (minimum). Prerequisites, Elementary Economics Agricultural Economics, Courses 11 and 7 (Agron. and Farm Management) or equivalents. May be chosen as a major or minor subject. (For graduate students.)

Special work in making farm management surveys of the farms of a certain territory or of special types of farming. Studies of the cost of producing certain farm products may also be undertaken in connection with the statistical route work of the Division.

17. Agronomy Technology

Three credits (six hours per week). Prerequisites, Agronomy, and one year each General Botany and Chemistry.

A study of field crops and their use in manufacturing commercial products.

AGRICULTURAL CHEMISTRY AND SOILS

AGRICULTURAL CHEMISTRY

Roscoe W. Thatcher, M.A., Professor of Agricultural Chemistry and Chief of Division of Chemistry 15 2d fl. Chemistry Bldg.

Rodney M. West, B.A., Assistant Professor of Agricultural Chemistry 16 2d fl. Chemistry Bldg.

Cornelia Kennedy, B.A., Instructor in Agricultural Chemistry 15 2d fl. Chemistry Bldg.

Clyde H. Bailey, Instructor in Agricultural Chemistry 5 1st fl. Chemistry Bldg.

SOILS

FREDERICK J. ALWAY, Ph.D., Professor of Soil Chemistry and Chief of Division of Soils
WILLIAM H. FRAZIER, B.S., Assistant Professor of Soils
12 2d fl. Chemistry Bldg.
WALTER D. BONNER, Ph.D., Assistant Professor of Physical Chemistry
GEORGE W. WALKER, B.S., Instructor in Soils
11 2d fl. Chemistry Bldg.
DE FOREST HUNGERFORD, B.S., Assistant in Soils

1. Chemistry of Plant and Animal Life Mr. WEST

Three credits (six hours per week); second semester. Required of sophomores in Agricultural Courses. Prerequisite, Chem. 3.

Some of the topics studied are: the ash elements of plants and their function in plant nutrition, the nitrogenous and non-nitrogenous compounds of plants and animals, the chemistry of seeds and plant growth, the factors influencing the composition and value of crops, and the composition and digestibility of foods. The chemical and allied changes which take place in the handling of milk and its manufacture into butter and cheese are also studied. Laboratory practice forms a prominent feature of the work.

2. Domestic Chemistry Miss KENNEDY

Three credits (six hours per week); first semester. Elective. Open to sophomores in Home Economics Course. Prerequisite, Chem. 3.

This course is devoted to a study of the chemistry of air, water, and food as related to human welfare. The following general topics are considered: composition of air and causes affecting the same, with special reference to air in dwellings; water: composition, safe water supplies, sources of contamination, and methods of detection and purification; fuels: composition and relative heating value; household chemistry; textiles; human foods: composition, changes taking place in preparation and preservation. Laboratory practice supplements the various topics taken up in class.

5. Quantitative Analysis Mr. WEST

Four credits (eight hours per week); first semester. Elective. Open to juniors. Prerequisite, Chem. 3.

An elementary course in quantitative analysis. The principles involved in gravimetric and volumetric analysis are studied. The work includes the gravimetric determination of iron, sulphur, phosphorus, magnesium, chlorine, acidimetry and alkalimetry, the volumetric determination of iron, calcium, and the principles of iodimetry. The purpose of this course is to prepare the student for advanced agricultural and soil analysis.

Students intending to pursue advanced work in Agricultural Chemistry or Soils should elect quantitative analysis in the junior year.

5a. Quantitative Methods Mr. WEST

Two credits (four hours per week); first semester. Required of sophomores in Home Economics Course. Prerequisite, Chem. 3.

This course includes a study of both gravimetric and volumetric methods of analysis with a few selected exercises in each. It is intended to make the student familiar with the use of the balance; the common quantitative operations and with the preparation and use of standard solutions. Some time is given to stoichiometric problems.

6. The Chemistry of Foods Mr. THATCHER

Three credits (three hours per week); second semester. Elective. Open to juniors in Home Economics Course. Prerequisite, Chem. 3.

Lectures. An advanced course treating of the composition, digestibility, and nutritive value of human foods. The processes employed in the preparation of foods, as the milling of wheat and other cereals, the economic uses of human and animal foods, the comparative value of foods, and the chemical methods employed in human nutrition investigations, particularly in proteid and carbohydrate metabolism, and the losses of energy from the body are studied. Dietary studies including the cost of nutrients and the influence of different methods of preparation upon their nutritive value, are also included in the work. It is the object of this course to familiarize the student with the fundamental principles of nutrition and the use of the literature upon the subject.

7. Analysis of Foods Miss KENNEDY

Three credits (six hours per week); second semester. Elective. Open to juniors. Prerequisite, Agr. Chem. 5.

This work includes the determination of water, ash, starch, sugar, cellulose, fats, proteids, and the different forms of nitrogen in foodstuffs, and the use of the calorimeter and polariscope in food analysis. Before completing the course each student makes a complete proximate analysis of some foodstuff. This course is planned to meet the wants of those who wish to become familiar with methods used in food analysis and nutrition investigation.

10. Chemistry of Wheat and Its Milled Products Mr. BAILEY

Three credits (six hours per week); first semester. Elective. Open to seniors. Prerequisite, Agr. Chem. 7.

This course is designed to meet the needs of those who wish to become familiar with the chemistry of the milling industry. It includes the determination of water, protein, ash, starch, sugar, gliadin and glutenin, fiber in wheat flour and mill feeds. Special attention is paid to the composition of wheat as affecting the quality of flour for breadmaking. Provision has been made for conducting milling tests with wheat, and baking and other physical tests with flour.

11. Advanced Agricultural Analysis Mr. THATCHER

Three credits (six hours per week); second semester. Elective. Open to seniors. Prerequisite, Agr. Chem. 7.

This course offers an opportunity for those who wish to pursue work along some special line in agricultural or food chemistry. Work such as digestion experiments, analysis of dairy products, composition of crops at different stages of growth, etc., may be taken if desired. Students desiring to take this course should arrange for it before the close of the junior year so that material may be obtained for the work.

12. Dairy Chemistry Mr. THATCHER

Three credits (six hours per week); second semester. Elective. Open to seniors. Prerequisite, Agr. Chem. 7.

An advanced course dealing with the chemistry of milk and its products. Laboratory practice includes the quantitative analysis of milk, butter, and cheese, and the detection of adulterants in those products.

13. Chemistry of Agricultural Products and By-Products Mr. WEST

Three credits (three hours per week); second semester. Elective. Open to seniors. Prerequisites, Agr. Chem. 5 and 7.

Lectures will cover the composition of the principal products and by-products of agriculture and their utilization as raw material in the various industries.

14. Soils Mr. BONNER

Three credits (six hours per week); first semester. Required of juniors in Agricultural Courses. Prerequisite, Chem. 3.

This course comprises a study of the soil from the geological, physical, and bacteriological standpoints, including such topics as soil formation, physical composition, and soil types and the relation of soil to water, air, heat, soil organic matter and its transformation into plant food. The various factors in the control of the physical condition of the soil are considered.

Laboratory practice: This work will consist mainly of a physical study of the soil. Some of the experiments are: determination of hydroscopic moisture; effect of drainage upon temperature of soil; flocculating action of lime; reaction of soils; apparent and real, specific gravity; porosity; conductivity; rate of percolation of air through soils; effects of soil mulches; influence of continuous cultivation and crop rotation upon the properties of soils; extraction of humus, and determination of soil type.

15. Soil Fertility Mr. FRAZIER

Three credits (six hours per week); second semester. Required of juniors in Agricultural Courses. Prerequisite, Agr. Chem. 14.

This course comprises a study of the inherent and cumulative fertility of soils. A further study of the interpretation of chemical analyses and composition of soils, the essential elements of plant food, their occurrence in the soil and availability, maintenance of fertility, green manuring, influence of soil bacteria, barnyard manures, commercial fertilizers, their manufacture and composition, draft of farm crops upon the soil, balanced soil conditions.

Laboratory practice: This consists of a short course in the principles of quantitative analysis followed by the analysis of soils, crops, and fertilizers for the essential plant-food elements, and a study of the chemical changes taking place in the soil, especially as influenced by different methods of cropping. Pot-culture work is used to illustrate the importance of the various plant-food elements, and commercial fertilizers in plant growth.

16. Physical Analysis of Soils Mr. FRAZIER

Three credits (six hours per week); first semester. Elective. Open to juniors. Prerequisites, Agr. Chem. 15 and 5.

Laboratory practice in the mechanical analysis of soils by the most important of the eleutriation and sedimentation methods as modified by the centrifuge. The student will be required to review and report other methods not used in the laboratory, and a study will be made of data available on physical composition of soils.

Students intending to take this or other advanced laboratory courses in soils should elect quantitative analysis in the junior year.

17. Chemical Analysis of Soils Mr. WALKER

Three credits (six hours per week); second semester. Elective. Open to juniors. Prerequisites, Agr. Chem. 15 and 5.

Laboratory practice in the chemical analysis of soils and a study of the chemical methods employed in soil investigation. The student will be required to analyze soil from his home farm before completion of the course.

18. Analysis of Fertilizers Mr. FRAZIER

Three credits (six hours per week); first semester. Elective. Open to seniors. Prerequisites, Agr. Chem. 15 and 5.

Laboratory practice in the analysis of fertilizers according to methods outlined by the Association of Official Agricultural Chemists. The object of this course is to prepare students as analysts for fertilizer control work.

19. Research Work in Soils Mr. ALWAY

Three credits (six hours per week); second semester. Graduate course. Open to seniors. Prerequisite, Agr. Chem. 17.

Special opportunity will be given students in this course to choose some line of investigation and do original work. A thesis will be required covering all previous data together with results of original work.

AGRICULTURAL EDUCATION

Ashley V. Storm, Phm.B., M.A., Professor of Agricultural Education and Chief of Division 204 Main Bldg.
Dexter D. Mayne, Professor of Agricultural Pedagogics 207 Main Bldg.
George A. Works, M.A., Assistant Professor 204 Main Bldg.
Edward C. Davis, B.S. in A.H., Instructor 204 Main Bldg.

Training School Staff

Ashley V. Storm, Director of Practice Teaching
Dexter D. Mayne, Principal of Training School
George A. Works, Critic Teacher in Agriculture
————————, Critic Teacher in Home Economics

1. Principles of Education — Mr. Works

Three credits (three hours per week); first semester. Required of sophomores in Home Economics Course and of sophomores in Agricultural Courses not electing French or German.

This course includes those underlying principles, social, economic, political, and psychological, upon which modern education rests, together with those practical principles of teaching that have been found best adapted to the successful conduct of the work of public schools and colleges. While essential for all who are to teach, it is valuable to those who wish to prepare to bear intelligently their civic responsibilities in public educational affairs.

2. Industrial Education ————

Three credits (three hours per week); second semester. Required of sophomores in Home Economics Course and of sophomores in Agricultural Courses who do not elect French or German.

This course includes a short history of industrial education; the present status of industrial education in Europe and in the United States; the place of manual training and home arts in an educational system; the place of agricultural teaching in the public schools; trade and vocational schools.

4. Organization and Management — Mr. Storm

Three credits (three hours per week); each semester. Required of seniors in Agricultural Education Course.

Attention will be given to the organization of management of work in secondary schools, particularly in the high schools of Minnesota, with special reference to agricultural work. Courses of study, programs, the correlation of industrial work, equipment, and similar practical problems will be considered.

5. Methods — Messrs. Works and Davis

Three credits (three hours per week); first semester. Required of seniors in Agricultural Education Course.

Consideration will be given to the fundamental principles of methods, the methods best adapted to various subjects; also to class recitation, laboratory work, demonstration plots, and extension work. In addition to the work offered by the regular agricultural education staff, students in this course will have the advantage of instruction from members of the faculty of other agricultural divisions, especially experienced in their different fields of work.

6. Practice Teaching Mr. WORKS

Three credits; each semester. Required of seniors in Agricultural Education Course.

Instruction will be given in methods of observation which will be followed by observing the work of the regular teachers. In addition, each student will be expected to teach regular classes in the Training School under the direction of critic teachers. The preparation of lesson plans, individual and group consideration of criticisms, will accompany the practice. The subjects in which practice work will be done will be those usually taught by the agricultural teacher in Minnesota high schools as now organized under the Putnam and Benson-Lee Acts. In addition to the work of the critic teacher, the student will receive critical assistance from members of the faculty in the other divisions of agriculture. Opportunity will be given a few to do actual teaching in the regular high schools of the State during a portion of the senior year. Opportunity will also be given to a limited number, who are especially prepared for the work, to obtain practice in extension work.

7. Administration of Industrial Subjects Mr. STORM

Three credits (three hours per week); second semester. Open to juniors and seniors. Given in 1913-14 by special arrangement only.

This course is particularly for those who do not expect to teach Agriculture, but who, as superintendents or high school principals, desire a more thorough knowledge of the purposes, values, content, methods, and organization of the industrial subjects in order more efficiently to administer them in the public schools. Consideration will be given to the pedagogical, social, and economic values; the organization, equipment, and conduct of classes; courses of study, methods, relation of this work to the community and to other school work, text-books, libraries, laboratories, etc. Opportunity will be given for discussions of the many problems of administration as affected by industrial work.

11. Methods in Home Economics

Three credits (three hours per week); second semester. Required of juniors in Home Economics Course.

This course gives a knowledge of the fundamental principles of method, followed by a consideration of the best methods to be used in the classroom, the laboratory, and the extension work. The work of this course will be given by the members of the faculty of Agricultural Education and of Home Economics.

12. Organization and Management of Home Economics Work

Three credits (three hours per week); each semester. Required of all seniors in Home Economics Course.

Attention will be given to the general plans of secondary school organization; the relation of Home Economics to other high school departments; courses of study, equipment, programs, records, class management, and other practical problems. Instruction will be given by members of the faculties of Agricultural Education and Home Economics.

13. Practice Teaching

Three credits; each semester. Required of seniors in Home Economics Course.

Instruction will be given in how and what to observe, followed by observing the work of the regular teachers. Students will then teach regular classes in the Training School under the direction of a critic teacher. The making of lesson plans and the discussion of criticisms will accompany practice. Opportunity may be given a few to do actual work, teaching in the regular high schools of the State during a portion of the senior year. Opportunity will also be given to a limited number, who are especially prepared for the work, to obtain practice in extension work.

AGRICULTURAL ENGINEERING

John T. Stewart, C.E., Professor of Agricultural Engineering and Chief of Division	7 Main Bldg.
Alvah M. Bull, Assistant Professor of Farm Structures	4 Drill Hall
Jason L. Mowry, Assistant Professor of Mechanics	6 Drill Hall
Harry B. Roe, B.S., Assistant Professor of Mathematics	6 Drill Hall
Hall B. White, B.S. in Agr., Instructor in Carpentry	6 Drill Hall
Allen D. Johnston, Instructor in Blacksmithing	Blacksmith Shop
Jenness B. Frear, M.E., Instructor in Mechanics	6 Drill Hall
Lloyd R. Whitson, E.M., Instructor in Drawing	8 Drill Hall

1a. Higher Algebra

Mr. Roe

Three credits (three hours per week); first semester. Required in Agricultural Courses of those who do not present Higher Algebra for entrance. Prerequisite, entrance mathematics.

Special attention is given to practical problems, short methods of computation, and a good foundation for plane trigonometry.

2a. Plane Trigonometry

Mr. Roe

Three credits (three hours per week); second semester. Required of freshmen in Agricultural Courses. Prerequisites, all entrance mathematics.

This course includes a short review of the essentials of Elementary Algebra and Plane Geometry, in which all students must show proficiency, the thorough study of the theory and use of logarithms and of the functions of Plane Trigonometry, with numerous practical applications. No student who has not completed the subjects of Higher Algebra and Plane Geometry, as given in accredited high schools, will be admitted to the course.

4. Mechanical Drawing

Mr. Whitson

Three credits (six hours per week); either semester. Elective in Home Economics and required in Agricultural Courses.

This course includes lectures on drawing; preliminary exercises in the use of drawing instruments; lettering; water coloring; the making of working drawings from models; and the practical value of drawing in arranging buildings, machinery, household equipment, etc.

5. Carpentry

Mr. White

Three credits (six hours per week); first semester. Elective.

Instruction is given by means of lectures on the care and use of the common carpenter tools, such as should be found on every farm; also on methods of farm building construction, framing, laying out rafters, stairways, estimating building materials, painting, etc. In the carpenter shop students are required to make mortise joints, splices, drawing boards, hammer handles, eveners, cupboards, etc. Each student is required to file his own saws, sharpen his planes, chisels, etc., and to lay out rafters for buildings.

6. Blacksmithing

Mr. Johnston

Three credits (six hours per week); second semester. Elective.

The students are instructed in the management of the forge and fire, and in bending, shaping, and welding iron and steel. Particular attention is given to rapid and accurate welding and to the sharpening and tempering of steel tools.

9. Farm Structures Mr. Bull

Three credits (six hours per week); first semester. Required of seniors in Agricultural Courses. Prerequisites, Agr. Eng. 4 and 11.

Each student selects an imaginary or real farm and makes drawings showing location of buildings, drives, yards, fences, etc., paying particular attention to locating each building and properly planning them so as best to meet the requirements of each individual farm and the means at hand for erecting them. Specifications and estimates of cost of buildings are also made.

10a. Household Mechanics Mr. Mowry

Three credits (six hours per week); first semester. Required of seniors in Home Economics Course. Prerequisite, Agr. Eng. 4.

This course includes lectures and seminar on location of farm buildings and of domestic science equipment; drives, yards, architectural designing, study of plans, fittings, and equipment; heating and plumbing systems; ventilation; light; floors; woodwork; painting. Each student makes a complete drawing of a house or domestic economics plan, paying particular attention to equipment.

11. Agricultural Physics Mr. Mowry

Three credits (three hours and laboratory period); second semester. Required of juniors in Agricultural Courses. Prerequisites, Agr. Eng. 2 and 4.

This work includes lectures, reference reading, and laboratory period on the theory and practical application of the ordinary subjects of physics, i. e., ventilation, as applied to dwellings and barns, pressure and flow of water, water supply, and drainage systems for the individual house; light: its theory, and methods of lighting buildings; heat and house heating systems; electricity and its application to the farm; sound, and rural telephone construction; manufacture of cement; properties and strength of wood, steel, and cement; laboratory work in pipe fitting, soldering, and rope splicing.

12. Farm Engineering Mr. Stewart

Three credits (six hours per week); second semester. Required in Agricultural Courses. Open to juniors and seniors only who have completed Agr. Eng. 2 and 4.

Methods of keeping original records; explosives and their use on the farm; the manufacture of drain tile and sewer pipe; temperature, rainfall, runoff. Methods of making U. S. land surveys, and the principles of resurveying, the improvement of farm lands by open ditches, under-drainage, levees, outflow culverts, and pumps. A brief summary of irrigation methods in the arid, semi-arid, and humid regions; roads and road construction in agricultural districts. Methods and cost of farm fencing.

15. Special Problems Mr. Stewart

Three credits, minimum; nine credits, maximum. Open to graduates of Engineering and Agricultural Colleges.

Investigation, collection of data, and compilation of facts relating to the various problems of engineering as applied to agriculture. Offered as special problems to individual students who have the necessary preparation for pursuing the line of work desired.

17. Farm Power Machinery Mr. Frear

Three credits (six hours per week); second semester. Open to seniors who have completed Agr. Eng. 11. Not given in 1913-14.

Lectures, problems, and laboratory work. This work includes a study of a few general technical terms that are necessary for a clear understanding and discussion of machines. The subjects considered are: flexible connectors, pulleys, shafting, gear wheels, bearings, oils, lubrication, and engines. Special emphasis will be put on the laboratory work.

18. Shop Work Messrs. JOHNSTON and WHITE

Three credits (six hours per week); second semester. Elective. Open to juniors in Agricultural Education only.

(a) Blacksmithing; instruction and practice work in the handling of forge and anvil, the bending, shaping, and welding of iron and steel, and the tempering of steel tools.

(b) Carpentry; practice work in the use and care of tools used in lumbering, saw filing, etc.

Note: Students taking any of the above courses must provide themselves with the necessary drafting instruments, regulation note-books, drawing paper, etc.

DAIRY AND ANIMAL HUSBANDRY

THEOPHILUS L. HAECKER, Professor of Dairy and Animal Husbandry and Chief of Division 30 2d fl. Dairy Hall

Animal Husbandry Section

HOWARD R. SMITH, B.S., Professor in Charge 2 2d fl. Live Stock Pavilion

JOSEPH S. MONTGOMERY, B.S. in Agr., Assistant Professor of Animal Husbandry 5 2d fl. Live Stock Pavilion

THOMAS G. PATERSON, B.S. in Agr., Assistant Professor of Animal Husbandry 15 1st fl. Main Bldg.

WILLIAM F. HAGERMAN, B.S. in Agr., Instructor in Animal Husbandry 3 2d fl. Live Stock Pavilion

KENNETH F. WARNER, B.A., Instructor in Animal Husbandry 3 2d fl. Live Stock Pavilion

Dairy Section

ROBERT M. WASHBURN, M.S.A., Associate Professor of Dairy Husbandry 38 2d fl. Dairy Hall

EDWIN O. HANSON, Instructor in Dairy Husbandry 1st fl. Dairy Hall

Poultry Section

ARTHUR C. SMITH, B.S., Professor in Charge 32 2d fl. Dairy Hall

DWIGHT J. LANE, Instructor in Poultry 32 2d fl. Dairy Hall

CHARLES H. MATTHEWS, Assistant in Poultry 32 2d fl. Dairy Hall

Animal Nutrition Section

ERNEST W. MAJOR, B.Agr., Associate Professor of Animal Nutrition

1. Breeds and Types of Live Stock Messrs. H. R. SMITH and MONTGOMERY

Three credits (six hours per week); first semester. Required of sophomores in Agricultural Courses.

This course includes a study of the types and breeds of horses, beef cattle, sheep, and swine. After the student is able to see clearly the difference in types of farm animals, attention is given to the study of the origin and development of the various breeds of live stock, special attention being given to those breeds which seem best adapted to Minnesota conditions. In connection with the study of the origin and characteristics of important breeds, practice work is given the students in judging typical specimens by the use of the score card.

2. Poultry — Messrs. A. C. Smith and Lane

(a) Three credits (three hours per week); first semester. Required of seniors in Dairy and Animal Husbandry Course.

(b) One credit (one hour per week); second semester. Elective. Open to seniors in Home Economics Course.

Instruction in this subject will include lectures on the following topics: history and characteristics of the most popular and practical breeds of poultry; feeding and management of fowls for egg production and for market; house construction and housing; incubation, brooding, dressing, and marketing, poultry diseases, and judging of popular varieties. Practice in pen management is required and practice in management of incubators and brooders will be given those who desire.

3. Meats — Mr. Paterson

One credit (two hours per week); first semester. Elective. Open to juniors in Home Economics Course.

The instruction given to the students in Home Economics in the subject of meats as it pertains to the selection and value of different classes of meats and to the best methods of curing and preserving.

4. Stock Judging — Messrs. H. R. Smith and Montgomery

Three credits (six hours per week); second semester. Required of sophomores in Dairy and Animal Husbandry Course. Prerequisite, Dy. and An. Husb. 1.

This course consists largely of practice work in judging without the score card. Having in mind the scale of points learned in Course 1, the students judge rings of animals by comparison, reporting fully in writing their reasons for placement. The purpose of this course is to make it possible for the student to discriminate carefully between profitable and unprofitable types of farm animals.

5. Stock Judging — Messrs. H. R. Smith and Montgomery

Three credits (six hours per week); first semester. Required of seniors in Dairy and Animal Husbandry Course. Prerequisite, Dy. and An. Husb. 4.

6. Animal Breeding — Messrs. Major and Lipp

Three credits (three hours per week); second semester. Required of juniors in Dairy and Animal Husbandry Course. Prerequisite, Zool. 1.

A study of the physiology of the reproductive organs of animals and of the processes of production; the causes and forms of variation; and laws of transmission and heredity; the application of these principles to the practical methods of breeding; a review of the practices of breeders famous for the improvement of live stock; outlines of methods for individual breeding operations, and for co-operative operations, including plans for a community co-operative breeding project.

7. Feeding and Management of Market Stock — Mr. H. R. Smith

Three credits (three hours per week); second semester. Required of juniors in Dairy and Animal Husbandry Course. Prerequisite, Dy. and An. Husb. 1.

This course deals with the study of the composition and digestibility of all foods useful for stock feeding purposes. Practice is given in the compounding of rations that will give the largest and most economical gains under Minnesota conditions. A careful review is made of the results of feeding experiments in other states. Attention is also given to the details in the practical management of stock which is being fed for market

8. Market Classes of Live Stock

Messrs. H. R. Smith and Montgomery

Three credits (six hours per week); first semester. Required of juniors in Dairy and Animal Husbandry Course. Prerequisites, Dy. and An. Husb. 1 and 4.

This will include a discussion of the various market classes of cattle, sheep, and hogs. Specimens for this work will largely be secured by going to South St. Paul and from the Station herds and flocks.

9. Meats Mr. Paterson

Three credits (six hours per week); first semester. Required in Dairy and Animal Husbandry Course. Open to sophomores.

A continuation of studies in meats as outlined in the School course, supplemented by dissection and studies of muscular structure of various kinds of meat. This course is designed especially for studying meat-making animals and their products. Under general guidance each student makes up rings of animals which he studies in detail, at every step from the live state until the different parts are cooked and tested at the table. Full records and conclusions, as well as illustrations, are required in thesis form.

10. Live Stock Records and Research Mr. H. R. Smith

Three credits (six hours per week); second semester. Elective for seniors in Dairy and Animal Husbandry Course.

This course will consist of reviewing literature upon different phases of stock production. The Experiment Station records and other sources of information will be used largely. This, together with original work, will form the basis of extended compilation of material on live-stock husbandry, and a thorough study of systems of keeping and compiling stock records upon stock farms, and at experiment stations. Sufficient actual practice will be required to become familiar with live-stock records and herd books.

11. Animal By-Products Mr. Paterson

One credit (two hours per week); second semester. Elective in Dairy and Animal Husbandry Course. Open to seniors only.

Individual study of the by-products manufactured at the large packing houses will be required of each student. The value and place that each has in economic use is considered.

12. Advanced Meats and Judging Mr. Paterson

Five credits (ten hours per week); second semester. Elective for juniors and seniors only.

Work along this line is a continuation of that begun in Course 9. More attention is given the more important details concerning meat, and a minute study of its physical and chemical composition is required.

13. Live-Stock Practicums Messrs. H. R. Smith amd Montgomery

Two credits (four hours per week); second semester. Elective for freshmen.

Feeding and stable management of cattle, horses, sheep, and swine; recording and calculating amounts of pasturage obtained from different forage crops, keeping herd records, writing pedigrees, and recording animals, calculating feeding records and cost of production.

14. Animal Nutrition Mr. Haecker

Three credits; first semester. Required of juniors in Agricultural Courses.

Lectures and classroom work. The principles of animal nutrition, their relation to the economic production of animal and animal products, and the relation of the constituents in feed consumed to amount and character of products produced, form the basis of this course. Accompanying this course there will be assignments carrying out some phase of animal production or the production of some animal product, tracing the disposition made of the nutrients in the feed.

15. Statistics of Nutrition — Mr. MAJOR

Second semester. Elective. Prerequisite, Dy. and An. Husb. 14.

This includes a thorough study of experiments made on ingo and expenditure of matter, and the income and expenditure of energy, the relation of food consumed to kinds and character of energy expended.

17. Dairy Stock Feeding and Management — Mr. WASHBURN

Three credits; first semester. Required of seniors in Dairy and Animal Husbandry Course. Prerequisite, Dy. and An. Husb. 14.

Lectures on the characteristics and nutritive value of fodders, feedstuffs, and forage crops. Pasturage, Soilage, and Silage systems of feeding compared. The rearing of the calf, the development of the heifer, the handling and feeding of the mature cow, practice work in formulating rations, the feeding and care of bulls, and stable arrangement for sanitary and economical production. One dairy barn plan will be required.

18. Dairy Stock Judging — Mr. MAJOR

Three credits (six hours per week); first semester. Required of seniors in Dairy and Animal Husbandry Course.

The gross anatomy of the dairy cow is studied, showing the relation of form to function. Complete life record of many cows is at the student's disposal, giving out only the total yield of each cow, but their economic production as well, placing the work on a scientific basis. A brief history of the dairy breeds is given and practical drill in breed characteristics. Many pure-bred herds in the vicinity of the Twin Cities are visited after laying a foundation by working on cows whose economic habits are known. The last six weeks of the semester are devoted to a systematic study of pedigrees.

19. Factory Management — Mr. WASHBURN

Three credits (three hours per week); first semester. Elective in Dairy and Animal Husbandry Course. Open to seniors.

Includes a study of the organization of creamery associations essential for success in operating creameries, the construction and equipment of whole milk and hand separator factories, and lectures on calculating dividends, sinking funds, percentage of yield, overrun, etc.

20. Factory Buttermaking — Mr. WASHBURN

Three credits (six hours per week); second semester. Elective in Dairy and Animal Husbandry Course.

Includes lectures on the composition of dairy products, separation of milk, cream ripening, preparation of pure culture starter, pasteurization, churning and working, controlling moisture content of butter, preparing the butter for market, a study of market requirements, the examination and scoring of butter and cheese and practical demonstrations in the college creamery, or four weeks in State Creamery.

21. Cheesemaking

Three credits; first semester. Elective in Dairy and Animal Husbandry Course. Open to seniors only. November 11 to December 7.

Includes lectures and practical work in making common and fancy cheese as brick, and Gouda; also advanced work in the study of the importance of the quality and composition of the milk in manufacturing Cheddar cheese; the principles involved in cutting, heating, milling, salting, and pressing the curd, curing and marketing cheese, and the construction and ventilation of factories and curing rooms. Factory practicums during vacation or four weeks' training in accredited cheese factory.

26. Elements of Dairy Husbandry Messrs. **Haecker** and **Washburn**

Three credits (six hours per week); second semester. Elective in Agricultural Courses.

Lectures giving instruction in the origin, characteristics, and adaptations of the dairy breeds of cattle, paying especial attention to relation of form to function. The feeding and management of the herd is carefully considered. Particular attention is given to adjusting the food supplied to the needs of the cow, based upon her productive capacity. The method of formulating rations is explained and typical rations discussed. This is followed by a thorough study of milk, its chemical and physical constituents, the relation of bacteriology to scientific dairying, the care and creaming of milk, making of butter, and operation of the Babcock test. Accompanying these lectures, practice work in butter-making, milk-testing, etc., is given.

28. Elements of Dairying Mr. **Washburn**

Three credits (six hours per week); second semester. Elective in Home Economics Course.

This course consists of a series of lectures upon the cow as a food-making machine, and her relation to child life. Particular attention is paid to market milk, but the making of butter, cheese, and ice cream are also thoroughly considered. The tests for fat and other solids, and the methods of detecting adulterations are taught. Practice work is required.

29. Creamery Practice Mr. **Washburn**

Three credits (four weeks, full time). Elective in Dairy and Animal Husbandry Course.

Actual experience in the factory is absolutely essential to an accurate knowledge or a full appreciation of the problems of dairy manufacture. For the purpose of equipping young men successfully to meet problems of this class, this minimum of four weeks' experience in an approved creamery is advised.

ENTOMOLOGY

Frederic L. Washburn, M.A., Professor of Entomology and Chief of Division 302 3d fl. Main Bldg.

Arthur G. Ruggles, M.A., Assistant Professor of Entomology 301 3d fl. Main Bldg.

Charles W. Howard, B.A., Instructor in Entomology 303 3d fl. Main Bldg.

1. General Entomology Mr. **Howard**

One credit (two hours per week); first semester. Elective. Open to juniors in Home Economics Course.

The structure and classification of insects. Study of injurious insects in different orders affecting the household and garden.

2. Economic Entomology Mr. **Washburn**

Three credits (three hours per week); first semester. Required of juniors in Agricultural Courses. Elective in Animal Nutrition Course. Prerequisite, Zool. 1 or its equivalent.

Lectures upon injurious insects of Minnesota and best methods of combating the same. The use of insecticides and spraying machinery. Beneficial insects.

2a. Economic Entomology Mr. WASHBURN

Three credits (three hours per week); second semester. Elective. Open to juniors or seniors. Prerequisite, Ent. 2 or its equivalent.

This course is a continuation of Course 2 and is advised for students specializing in Agriculture and Horticulture, or planning advanced work in the sciences. Before electing students should confer with the Chief of the Division.

4. Comparative Anatomy and Histology of Insects Mr. RUGGLES

Three credits (six hours per week); first and second semesters. Elective. Open to juniors and seniors. Prerequisites, Zool. 1 and Ent. 2, or equivalents.

A detailed study of structure of representatives of different orders of insects.

5. Elements of Bee-Keeping Mr. WASHBURN

One credit (two hours per week); second half, second semester. Elective. Open to juniors and seniors. Prerequisites, Ent. 1 or Ent. 2, or equivalent.

One lecture a week and work in apiary.

6. Special Problems Mr. WASHBURN

Six credits (three hours per week); first and second semesters. Elective. Graduate course. Prerequisites, Zool. 1, Ent. 2 and 2a, or equivalents.

Before electing students should confer with Chief of the Division.

7. Animal Parasites and Parasitic Diseases Mr. HOWARD

Three credits (two hours per week); first semester and first half of second semester. Prerequisites, Zool. 1 and Ent. 2, or equivalents. Prospective students should confer with the Chief of the Division before registering for the course.

(a) First semester: A consideration of the life-history, biological relations, and means of combating the more common parasites of man and the domestic animals.

(b) Second semester: A consideration, from a practical standpoint, of the agency of insects and insect-like animals in the transmission of diseases of man and animals.

Students may register for either portion of this course and receive proportionate amount of credit.

8. Game Protection and Fish Culture Mr. WASHBURN

One credit (three hours per week); first half, second semester. Junior or Senior elective.

Relations of game and other birds, and of various four-footed animals, to forest protection. Habits, range, usefulness, or the contrary; the manner of protecting the important large and small game, fish, and birds.

9. Advanced Histology and Morphology of Insects Mr. RUGGLES

Four credits (minimum). Open to graduate students who have had Course 4 or its equivalent.

Lectures and laboratory work.

10. Economic Zoology (Farm Zoology) Mr. **Washburn**

One credit (one hour per week); second semester. Open to juniors and seniors. Prerequisite, Zool. 1 or equivalent.

The relation of four-footed wild animals and of birds to agriculture.

11. Systematic Entomology Mr. **Ruggles**

Three or six credits (six hours per week minimum); both semesters. Prerequisites, Zool. 1 and Ent. 2, or equivalents.

A laboratory course open to juniors and seniors.

HOME ECONOMICS

Josephine T. Berry, M.A., Professor of Nutrition and Head of the Division
Louise McDanell, M.A., Assistant Professor of Foods and Cookery
Grace I. Williams, B. S., Instructor in Foods and Cookery
Bessie Bemis, B.S., Instructor in Foods and Cookery
1st fl. Domestic Science Bldg.
***Marion Weller**, Assistant Professor of Textiles
——————————, Instructor in Charge of Textiles (1913-1914)
——————————, Instructor in Textiles
Greta E. Smith, Instructor in Textiles 323 3d fl. Main Bldg.
Fannie C. Boutelle, Instructor in Home Economics
33 Main fl. Girls' Old Dormitory
Harriet Goldstein, Instructor in Drawing and Design
Martha B. Moorhead, M.D., Lecturer in Domestic Hygiene

2. Sewing and Garment Making ——————

Three credits (six hours per week); each semester. Required of all freshmen in the Home Economics Course who do not offer Domestic Art for entrance. Prerequisite, Drawing and Design.

The course includes instruction and laboratory practice in hand-sewing; in the reading and adaptation of commercial patterns; in the construction and use of the sewing machine; in designing, cutting, and making under-garments, and some simple outer garments.

3. Dressmaking ——————

Three credits (six hours per week); each semester. Required of juniors in the Home Economics Course. Prerequisites, Home Econ. 2 and 4; Drawing and Design.

This course includes further instruction in the reading, alteration, and adaptation of standard commercial patterns to problems of elementary dress design and construction; careful consideration of quality, suitability, and cost in the selection of dress fabrics; instruction and practice in correct cutting, fitting, and methods of construction. Both washable and unwashable materials will be used, and as large a variety of dresses and outer garments made as is possible within the time limits of the course.

4. Textiles and Textile Economics ——————

Two credits (four hours per week); each semester. Required of freshmen in the Home Economics Course. Prerequisite, Chem. 2.

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*Term of service begins August 1, 1914.

A study of the textile fibers and fabrics as to structure and properties, especially as these relate to art and economic considerations involved in selection and purchase of clothing and household furnishings.

5. Decorative Needle Work ————

Two credits (four hours per week); each semester. Required of juniors in the Home Economics Course. Prerequisite, Home Econ. 2.

This course will include applied design in embroidery, lace, and various types of trimmings as employed in the decoration of clothing and house-furnishings.

6. Interior Decoration, House Furnishing, and Equipment ————

Three credits (six hours per week); second semester. Required of seniors in the course in Home Economics. Prerequisites, Drawing and Design, and Home Econ. 4.

This course includes a review of historic types of architecture with related period styles of furniture, decoration, and fabrics. Considering the average income as the chief factor in selection, such topics are discussed as the economic value of good art principles applied in selections; the adaptation of historic types of furnishings to modern conditions of structural furniture; the qualities of durability in fabrics, etc. Lectures, demonstrations, assigned reading, and experimental plans adapted to homes of varying styles and cost. (Not offered in 1913-1914.)

7. Costume Design and Construction ————

Three credits (six hours per week); first semester. Required of seniors in the Home Economics Course. Prerequisites, Home Econ. 3, 5, Drawing and Design.

This course includes a study of the principles of proportion, line, and color harmony as fundamental to artistic costume design; required original designs for costumes of varying types and materials, with simple and appropriate decoration. The constructive work will involve designing and modeling on the form, fitting, draping, and finishing. Several dresses will be made, and students will be required to produce artistic results, of good technique and at the minimum cost.

21. Foods and Cookery — Misses McDanell and Williams

Three credits (six hours per week); first semester. Required of sophomores in the Home Economics Course. Students presenting Domestic Science for entrance may elect a substitute. Prerequisite, Chem. 2. Parallel course, General Physiology.

(a) Production, manufacture, and chemical composition of typical foods; their classification into food principles; changes undergone in digestion; function in nutrition.

(b) Study of fundamental science principles from chemistry, physics, biology, and bacteriology, and their application in the cooking of typical foods.

22. Food Economics ————

Three credits (six hours per week); second semester. Required of sophomores in the Home Economics Course. Prerequisite, Home Econ. 21. Parallel courses, Vegetable Pathology 8, General Bacteriology.

Cost and nutritive value of typical foods; their place in the dietary; principles of selection; preparation and serving of meals, the cost bearing a relation to the family budget; the nutritive requirement as influenced by activity, size, and age.

23. Camp Cookery ——————

One credit (two hours per week); each semester.

This course is designed to give prospective foresters, engineers, and others a knowledge of the simpler cookery processes; and of such adaptations as are practicable in the several types of out-of-doors camps.

41. Nutrition I Miss Berry

Five credits (ten hours per week); first semester. Required of juniors in the Home Economics Courses. Prerequisites, Chem. 2, 3, Agr. Chem. 5a, Organic Chemistry, and Bacteriology (Veg. Path. 8).

A study of the chemistry and physiology of metabolism, involving a qualitative examination of the food principles; of the body tissues; of salivary, gastric, and pancreatic digestion.

42. Nutrition II Miss Berry

Five credits (ten hours per week); second semester. Required of juniors in the Home Economics Courses. Prerequisite, Home Econ. 41.

A continuation of Nutrition I, including the qualitative examination of blood, bile, milk; urine analysis; metabolism experiments.

43. Research Problems in Nutrition Miss Berry

Five or ten credits. (Not offered in 1913-1914.)

44. Dietetics Miss Berry

Three credits (six hours per week); second semester. Required of seniors in the Home Economics Course. Prerequisites, Nutrition I and II.

This course aims to present the fundamental principles of human nutrition, and to apply them to the feeding of individuals and groups under conditions of health, and under such pathological conditions as are chiefly dependent upon dietetic treatment. Dietaries for families of different incomes, for infants and children, for the aged, for diabetes, tuberculosis, heart disease, constipation, fevers, Bright's disease, gout, malnutrition, and obesity, are considered in lectures, discussions, and laboratory exercises.

52. Laundry Methods and Management ——————

One credit (two hours per week); second semester. Required of sophomores in the Home Economics Course. Prerequisites, Chem. 2 and Home Econ. 4.

(a) A study of dyes and mordants; of soaps and cleansing agents; of blueings; of bleaching agents; of stains and their removal; of methods of removing the hardness of water.

(b) The washing and ironing of typical "linens" and garments; and of silk and wool fabrics.

54. Home Care of the Sick Dr. Moorhead

One credit (two hours per week); each semester. Required of juniors in the Home Economics Course.

The care of the sick, accidents and emergencies, infectious diseases, especially the contagious diseases of childhood, typhoid fever, and tuberculosis; causes, means of transmission, methods of prevention. Personal hygiene, hygiene of infancy, maidenhood and maternity.

55. Drawing and Design — Miss Goldstein

Five credits (ten hours per week); first semester. Required of freshmen in the Home Economics Course.

Study of proportion and form, including drawing from plants and other objects. A study of perspective in rectangular and cylindrical objects. Interior drawings. Adaptation of designs of articles of household use, etc.

56. Design and Historic Ornament ————

Five credits (ten hours per week); second semester. Elective. (Not offered in 1913-1914.)

57. Education; Curricula; Equipment; Methods of Teaching — Miss Berry

Five credits (ten hours per week); second semester. This course or an approved equivalent required of seniors in the Home Economics Course who are prospective teachers. Prerequisite, General Psychology.

This course includes observation of teaching, the making of lesson plans, outlines for courses of lessons, and practice teaching. It considers, also, the planning of courses for rural schools, grade classes, and high schools, together with sketches and architectural drawings of types of equipment as limited by use and cost. Lectures and discussions.

58. The Family — Mrs. Boutelle

Three credits (three hours per week); second semester. Required of seniors in the Home Economics Course.

History of the family as an institution. The economic functions of the family with regard to industry, prosperity, education, and population. The psychology of family life. Lectures, problems, and recitations.

59. Euthenics — Mrs. Boutelle

Three credits (three hours per week); first semester. Elective. Open to seniors only.

A study of controllable environment and those social agencies which may impair or improve the characteristics of the human race. A brief consideration of the conservation of human powers both by the individual and by the state.

60. The Position of Women — Mrs. Boutelle

Two credits (two hours per week); second semester. Required of seniors in the Home Economics Course.

Conservatism of women and the difficulty of dealing with women as an economic factor. Effect of social and industrial changes and of economic independence on women. Co-operation with special reference to women's work. Child labor from an economic standpoint. Women's clubs, their history, use, and abuse, and relation to civic life. Investments with special reference to the principles which should govern the investments of women. Lectures, problems, and recitations.

61. The Home — Mrs. Boutelle

Three credits (three hours per week); first semester. Elective in the Home Economics Course. Prerequisite, Home Econ. 58. (Not given in 1913-1914.)

The evolution of the modern home from primitive conditions. Evolutions of the social, industrial, religious, and economic conditions in the home, and their relation to civic life. Influence of the standard of living. Administration, organization, and maintenance of the home. Lectures, problems, and recitations.

63. Domestic Service Mrs. Boutelle

Three credits (three hours per week); second semester. Elective in the Home Economics Course. Prerequisite, Home Econ. 61. (Not given in 1913-1914.)

History of domestic service in Europe in so far as it has affected domestic service in America. History of domestic service in America. Economic phases of domestic service, General principles upon which remedies for existing evils should depend. Lectures, problems, and recitations.

HORTICULTURE

LE ROY CADY, B.S. in Agr., Associate Professor of Horticulture, Acting Chief of Division 22 2d fl. Horticulture Bldg.

RICHARD WELLINGTON, M.A., Assistant Professor of Pomology

WILFRID G. BRIERLY, B.S.A., Assistant Professor of Horticulture 22 2d fl. Horticulture Bldg.

MAXWELL J. DORSEY, M.S.A., Instructor in Horticulture 22 2d fl. Horticulture Bldg.

1. Commercial Fruit Growing Mr. Wellington

Three credits (three hours per week); first semester. Required in Horticulture Course. Open to juniors and seniors. Prerequisite, Hort. 10.

Geography of fruit growing, soils, tillage, soil fertilization, pollination, orchard protection, harvesting, storing, and marketing of fruits, yields, cost of production, profits, etc., and a brief study of the growing of tropical and sub-tropical fruits. Lectures and references.

2. Market Gardening Mr. Brierly

Three credits (six hours per week); second semester. Required in Horticulture Course. Open to juniors and seniors. Prerequisite, Hort. 10.

Geography of vegetable growing, soils, tillage, soil fertilization, seed sowing, vegetables under glass, pollination, crop protection, storage, harvesting, and marketing of vegetables, commercial methods in the production of the various vegetable crops, yields, cost of production, profits, etc. Lectures, references, and a study of commercial practice in the vicinity of the Twin Cities.

4. Nursery Practice Mr. Cady

One and one-half credits (six hours per week); first half, first semester. Required of juniors in Horticulture Course. Prerequisite, Hort. 10.

Seedage, layerage, cuttings, graftage, planting, pruning, thinning, storage of nursery stock; tillage of nursery lands; relation of insect and fungus diseases to nursery stock. Lectures and practice work.

5. Floriculture Mr. Cady

Three credits (six hours per week); second semester. Required in Horticulture Course. Open to juniors and seniors. Prerequisite, Hort. 10.

Lectures and laboratory work. Greenhouse management; temperature; soil; watering; benches; propagation; prevention of diseases and extermination of insects; rest and growth periods of plants; plants for greenhouse cultivation.

6. Landscape Gardening — Mr. Cady

Three credits (three hours per week); first semester. Required of seniors in Horticulture Course.

A general course in the practice and principles of landscape gardening, special attention being given to the planting of small grounds.

7. Plant Breeding

Three credits (six hours per week); second semester. Required in Horticulture Course. Open to juniors and seniors. Prerequisites, Hort. 10, Agr. 4. Not given in 1913-14.

Lectures and laboratory work. The fact and philosophy of variation; crossing of plants; origin of horticultural varieties of plants.

8. Systematic Pomology — Mr. Wellington

Three credits (six hours per week); first semester. Required in Horticulture Course. Open to juniors and seniors. Prerequisite, Hort. 10.

The classification and distribution of temperate, sub-tropical, and tropical fruits; technical description and general study of the more important varieties; identification of varieties; judging of fruits; fruit literature. Lectures, laboratory work, and references.

9. Orchard Spraying ————

One and one-half credits (six hours per week); last half, second semester. Required of seniors in Horticulture Course. Prerequisite, Hort. 10, Plant Path. 1, and Ent. 2.

A study of spraying materials and compounds; their preparation and application. A large number of spraying mixtures will be prepared in the laboratory, types of machinery and apparatus for their application will be studied, and practice given in the application of the more important applications.

10. General Horticulture — Mr. Cady

Three credits (six hours per week); second semester. Required of sophomores in the Agricultural Course and elective in the Home Economics Course.

The course will cover in an elementary way the principles of fruit growing, vegetable gardening, and plant propagation. Two classroom periods and one afternoon for laboratory work.

11. Greenhouse Construction — Mr. Cady

One and one-half credits (six hours per week); first half, second semester. Required of seniors in Horticulture Course.

Evolution of the greenhouse; types of houses; materials and methods of construction. Laboratory work in planning and estimating cost of glass houses. Excursions.

12. Advanced Horticulture — Messrs. Cady, Dorsey, and Wellington

Six credits (minimum). Open to graduates who have completed undergraduate work preparatory to advanced special work in Horticulture, along one of the following lines: plant breeding, vegetable gardening, pomology, or floriculture.

The course will consist of lectures, research, field and laboratory work along the line selected. One season's work at University Farm, Fruit Farm, or other approved horticultural establishment will be required.

PHYSICAL TRAINING

Grace E. Denny, B.S., Instructor

1. Physical Training — Miss Denny

Two credits (three hours per week); both semesters. Elective in Home Economics Course.

This course includes careful analysis of standing position and walking, aiming to correct faulty posture and to produce grace and strength; exercises of hygienic value relieving abnormal conditions and strengthening the heart, lungs, and digestive organs; aesthetic and folk dancing; also exercises with special attention to deep breathing; cross country tramps, skating, tennis, and games.

2. Advanced Physical Training — Miss Denny

Two credits (three hours per week); both semesters. Elective in Home Economics Course. Open to those who have completed Course 1.

Advanced work in continuation of Course 1.

RHETORIC

Robert C. Lansing, M.A., Assistant Professor of English
36 2d fl. Dairy Hall
Estelle Cook, Instructor in English — Pendergast Hall
Julian H. Gist, M.A., Instructor in Rhetoric

1. General Rhetoric — Mr. Lansing

Six credits (three hours per week); both semesters. Required of freshmen in Agricultural and Home Economics Courses.

In the first semester, numerous short themes, both oral and written, are required, Instruction is given in note-taking, thesis-writing, and sentence construction. All students who on examination prove to be deficient in grammar have special work in that subject. The second semester is taken up with a study of the principles of exposition, narration, and description. Throughout the year readings in standard books are assigned.

2. Argumentation — Mr. Lansing

Six credits (three hours per week); both semesters. Required of sophomores in the Agricultural Course. Prerequisite, Rhetoric 1.

The course consists of a study of the rules of reasoning, the tests of evidence, and effective presentation. There is frequent practice in writing, briefing, and speaking both from the floor and formal debate.

4. Public Speaking — Mr. Gist

Three credits (three hours per week); both semesters.

This course consists of the study and practice of the fundamental principles of voice production, articulation, gesture, platform, deportment, and expression.

5. English — Mr. Lansing

Six credits (three hours per week); both semesters. Prerequisite, Rhetoric 1.

First semester: A survey of the important periods and writers in the history of English literature. Second semester: A study of Shakespeare, Tennyson, and Browning.

VEGETABLE PATHOLOGY AND BOTANY

Edward M. Freeman, Ph.D., Professor of Vegetable Pathology and Botany and Chief of Division 30 3d fl. Horticulture Bldg.
Wieland L. Oswald, Assistant Professor of Agricultural Botany 31 3d fl. Horticulture Bldg.
Elvin C. Stakman, M.A., Instructor in Vegetable Pathology 35 3d fl. Horticulture Bldg.
Arne G. Tolaas, M.S., Assistant in Bacteriology 35 3d fl. Horticulture Bldg.

1. Plant Pathology Messrs. **Freeman** and **Tolaas**

Three credits (six hours per week); first semester. Required of juniors in the Agricultural Course. Prerequisite, Botany 1.

General outline of the diseases of plants due to fungus organisms; a special study of the life-history and classification of the most important plant diseases, particularly those affecting economic plants of Minnesota. Methods of prevention and cure are also included. Lectures, reference reading, laboratory, and thesis work.

3. Agricultural Botany Mr. **Oswald**

Three credits (six hours per week); second semester. Required in the Agricultural Course. Open to juniors and seniors. Prerequisite, Botany 1.

This course includes a study of weeds and weed seeds and methods of detection and eradication. Special study of impurities of Minnesota seeds is made. Methods of seed testing both for purity and germination are given. The study of weeds includes the common weeds and other plants of agricultural importance, their distribution, history of introduction, and botanical features.

4. Advanced Pathology Mr. **Stakman**

Six credits (six hours per week); both semesters. Elective. Open to seniors. Prerequisite, Veg. Path. 1, Mycology.

Special cultural and laboratory methods in Plant Pathology. Special practical problems in plant diseases. Laboratory, reference, and lecture work.

5. Advanced Pathology Mr. **Freeman**

Graduate course. Prerequisites, Botany 3, Veg. Path. 1, Mycology.

Special problems in the investigation and prevention of plant diseases. This course is designed for minor or major subjects for candidates for advanced degrees.

6. Advanced Agricultural Botany Mr. **Freeman**

Six credits (six hours per week); both semesters. Elective. Open to seniors. Prerequisite, Veg. Path. 3.

Special work along agricultural botanical lines. Special problems in seed testing and weed work.

7. Advanced Agricultural Botany Mr. **Freeman**

Graduate course. Prerequisites, Botany 3, Veg. Path. 1, 3, 4, and 6.

Special problems in agricultural botany. Designed for minor or major subject for candidates for advanced degrees.

8. General Bacteriology (Plant Pathology Division) Mr. Stakman
(Dairy Division) Mr. R. M. Washburn
(Veterinary Division) Mr. Willey

Three credits (six hours per week); second semester. Required of sophomores in House Economics Course. Open to sophomores, juniors, and seniors in Agricultural Course. Prerequisites, Bot. 1 and Chem. 3.

General introductory outlines of Bacteriology including classification, culture methods, and biology of bacteria with special reference to agricultural importance (Division of Vegetable Pathology), followed by special work in dairy bacteriology (Dairy and Animal Husbandry Division), and in human and animal pathology (Veterinary Division). (See Dairy and Animal Husbandry 25 and Veterinary Science 6.)

9. Industrial Mycology Mr. Stakman

Three credits (six hours per week); second semester. Elective. Prerequisite, Veg. Path. 1.

A continuation course of elementary Plant Pathology, dealing largely with laboratory methods, and a more detailed study of types of diseases and of fungi and bacteria which are of importance in Agriculture and allied industries. Should be taken as a preparation for Veg. Path. 4.

10. Seed Testing Mr. Oswald

Three credits (six hours per week); second semester. Elective. Prerequisite, Veg. Path. 3.

A detailed study of seed laboratory tests for purity and germination of commercial seeds; actual practice in making tests and a study of seed legislation of different states and foreign countries.

VETERINARY SCIENCE

Myron H. Reynolds, B.S.A., D.V.M., M.D., Professor of Veterinary Medicine and Surgery and Chief of Division
16 2d fl. Veterinary Bldg.
Charles C. Lipp, D.V.M., Assistant Professor of Veterinary Medicine and Surgery
15 2d fl. Veterinary Bldg.
Willard L. Boyd, D.V.S., Instructor in Veterinary Medicine and Surgery
15 2d fl. Veterinary Bldg.
Louis E. Willey, D.V.M., Instructor in Veterinary Science
11 2d fl. Veterinary Bldg.
Horace Preston Hoskins, D.V.M., Instructor in Veterinary Science
16 2d fl. Veterinary Bldg.

1. Veterinary Work Mr. Reynolds

Three credits (three hours per week); second semester. Required of juniors in Agricultural Course.

This course is given by lecture, by practicum, and by text. Its purpose is to fit students for intelligent care of farm stock. The work will cover animal physiology, anatomy, elementary pathology, causes and prevention of disease, lameness, unsoundness, and common medicines; and will be illustrated by stereopticon, charts, skeletons, and manikins.

2. Anatomy of Digestion Mr. Boyd

One and one-half credits (three hours per week); first half, second semester. Required. Open to juniors and seniors. Prerequisite, Vet. 1.

Comparative anatomy of the digestive organs, dissection, collateral reading, and recitations. Chauveau's *Comparative Anatomy* is used for reference and comparison.

3. Physiology of Nutrition Mr. Lipp

One and one-half credits (three hours per week); last half, second semester. Required. Open to juniors and seniors. Prerequisite, Vet 2.

This is an advanced study of the veterinary physiology of digestion, taking up the digestive fluids, nervous mechanism of digestion, absorption and digestion of grains and fodders. It also includes a study of body nutrition, body income and expenditures, source of heat supply and heat loss, and metabolism. Veterinary Physiology, by F. Smith, is used as a text and guide for this work, but students are required to do collateral reading.

4. Anatomy of Locomotion and Conformation Mr. Willey

Two credits (four hours per week); first half, second semester. Elective. Prerequisite, Vet. 1.

This course deals with the anatomy of locomotion. The bones, articulations, and muscles involved in locomotion and conformation are studied by text-book, dissection, and collateral reading. Strangeway's *Veterinary Anatomy* is used as a text-book and Chauveau for reference.

5. Common Diseases Mr. Reynolds

One and one-half credits (three hours per week); last half, second semester. Elective. Open to sophomores and juniors.

This course deals with common and serious diseases of domestic animals, their causes and prevention, and, in some cases, treatment.

6. General Bacteriology

See Vegetable Pathology, Course 8.

COURSES OF STUDY IN OTHER COLLEGES

BOTANY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

*Frederic E. Clements, Ph.D., Professor, Head of Department of Botany	207 Pillsbury Hall
Josephine E. Tilden, M.S., Professor	214 Pillsbury Hall
Carl O. Rosendahl, Ph.D., Professor	18 Pillsbury Hall
Ned L. Huff, M.A., Assistant Professor	214 Pillsbury Hall
Frederic K. Butters, B.S., B.A., Assistant Professor	206 Pillsbury Hall
Herbert F. Bergman, B.Sc., Assistant Professor	16 Pillsbury Hall
Edith Clements, Ph.D., Instructor	207 Pillsbury Hall

1. General Botany Messrs. Clements, Huff, Butters, and Bergman

Six credits (six hours per week); both semesters. Open to freshmen.

Laboratory study of the structure of flowering plants, from organs through parts and tissues to cells, followed by a brief study of common types of flowerless plants, leading to the origin of the flower and seed habit, and the classification of flowering plants; greenhouse study of the behavior of plants, correlated with the study of organs and tissues, and field work and classification of trees and shrubs, fruits and seeds, buds and shoots, and spring flowers.

1a. General Botany Messrs. Clements, Huff, Butters, and Bergman

Three credits (six hours per week); first semester. Open to freshmen in Home Economics Course.

Laboratory and greenhouse study of the form and behavior of the common plants of field and garden, with especial emphasis upon the elementary facts of nutrition, growth, and response to environment, together with the correlation of functions in plants and animals.

2. Advanced Botany

Messrs. Clements, Rosendahl, and Bergman, Mrs. Clements

Six credits (six hours per week); both semesters. Open to sophomores. Prerequisite, Bot. 1.

Greenhouse and field study of the important flower families from the standpoint of evolution, classification, and identification, with especial reference to woody plants, composites, weeds, and grasses; in the second semester the emphasis is upon pollination and seed production, following the life-history from the origin of pollen grains and ovules through fertilization, development of the embryo, germination, and growth; during the spring particular attention is given to the correlation of the year's results by means of the chart method of identification and classification.

3. Physiology and Ecology Mr. Clements

Six credits (six hours per week); both semesters. Open to juniors. Prerequisites, Bot. 1 and 2.

Study of the factors which make the plant's home, viz., water, light, heat, soil, etc.; response of the plant to its home, absorption, transport, water-loss, food-making, storage, growth, fertilization, and reproduction; adaptation of plants to their various homes, and the

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*On leave of absence, 1913-14.

origin of new forms by selection, adaptation, mutation, and hybridization; structure and development of vegetation, i. e., grouping, migration, competition, acclimatization, invasion, succession, zonation, etc., of plants.

5. Fungi — Mr. Clements

Six credits (six hours per week); both semesters. Open to juniors and seniors. Prerequisites, Bot. 1 and 2.

The classification and life-history of the various groups of fungi, based on identification, cultures, and field work, with particular reference to forms which cause plant and animal diseases. Discussions and quizzes, laboratory, greenhouse, and field work.

7. Flowering Plants — Mr. Rosendahl

Six credits (six hours per week); both semesters. Open to juniors and seniors. Prerequisites, Bot. 1 and 2.

The course is designed to afford the student an opportunity to become proficient in the determination of plant species and plant types, as well as to show the genetic development and relationships of the flowering plants. Lectures, reference reading, laboratory, greenhouse, and herbarium work, together with field work in the fall and spring.

8. Ecology — Mr. Clements

Six credits (six hours per week); both semesters. Open to juniors and seniors. Prerequisites, Bot. 1, 2, and 3.

A critical study of plant habitats by means of instruments, and the adaptations produced by water and by light, together with a careful examination of the causes and reactions of plant formations. Class discussions and quizzes, field and greenhouse work.

9. Plant Physiology — Mr. Clements

Six credits (six hours per week); both semesters. Open to juniors and seniors. Prerequisites, Bot. 1, 2, and 3.

A study of the relations of factor, function, and structure in the various organs of the plant, with special reference to absorption, transpiration, photosynthesis, respiration, irritability, and reproduction. Class discussions and quizzes, greenhouse and field work.

11. Industrial Botany — Miss Tilden

Six credits (six hours per week); both semesters. Open to juniors and seniors. Prerequisites, Bot. 1 and 2.

A study of the origin, distribution and cultivation of plants yielding products of economic value, the nature and use of these products, and the processes by which they are obtained from the plants. Lectures, demonstrations, topics, and laboratory work.

CHEMISTRY

SCHOOL OF CHEMISTRY

George B. Frankforter, M.A., Ph.D., Professor, Head of Department of Chemistry	114 Chemistry Bldg.
Ira H. Derby, Ph.D., Assistant Professor	220 Chemistry Bldg.
Edward E. Nicholson, M.A., Assistant Professor	104 Chemistry Bldg.
Frank W. Bliss, M.S., Instructor	205 Chemistry Bldg.
Lillian Cohen, M.S., Instructor	106 Chemistry Bldg.
Lillian L. Nye, M.A, Instructor	106 Chemistry Bldg.

2. General Chemistry (Given at University)
Mr. Frankforter and Instructors

Three credits (two lectures, four laboratory hours per week); first semester. Open to freshmen.

This course includes a study of the chemical properties of the metallic and nonmetallic elements, with a brief introduction to organic chemistry.

3. Qualitative Analysis (Given at University)
Messrs. Nicholson and Bliss

Three credits (one lecture, four hours laboratory per week); second semester. Open to freshmen.

This course includes the general reactions of the metals and acids with their qualitative separation. Besides this mechanical work, the ionic theory and the law of mass action are discussed with special reference to common qualitative reactions.

9. Organic Chemistry (Given at University)
Mr. Frankforter and Instructors

Six credits (six hours per week); both semesters. Open to juniors. Prerequisite, Chem. 3. Elective.

Lectures and laboratory work. The course includes the aliphatic and aromatic series with the preparation of the more important compounds.

14. Physical Chemistry (Given at University) Mr. Derby

Four credits (one lecture, six hours laboratory per week); first semester. Open to seniors. Prerequisite, Chem. 5. Elective.

This course enables the student to gain a wide and varied knowledge of physico-chemical principles and methods, both from the theoretical and practical standpoint.

ECONOMICS

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

John H. Gray, Professor, Head of Department of Economics
106 Mechanic Arts Bldg.
Edward Van Dyke Robinson, Ph.D., Professor
204 Mechanic Arts Bldg.
Carl W. Thompson, M.A., Associate Professor and Director of Bureau of Research in Agricultural Economics in the Department of Agriculture
206 Mechanic Arts Bldg.
Thomas Warner Mitchell, Ph.D., Assistant Professor
105 Mechanic Arts Bldg.
Jeremiah S. Young, Ph.D., Assistant Professor
103 Mechanic Arts Bldg.

1. Element of Economics Mr. Thompson

Three credits (three hours per week); first semester. Required of juniors in Agricultural, Forestry, and Home Economics Courses; designed for those who desire a general knowledge of Economics and as an introduction to more advanced courses offered in the Department.

2a. Physical and Human Geography Messrs. LEHNERTS and ROBINSON

Six credits (three hours per week); both semesters. Open to sophomores, juniors, and seniors who have not taken Geology 29. Constitutes a unit course for which no credit is allowed until both semesters are completed. May be counted toward a major or minor in either the Department of Geology and Mineralogy or the Department of Economics and Political Science.

First semester, given by Mr. Lehnerts: Fundamental physiographic facts, processes and relations, with special reference to their effect on the activities of mankind; planetary relations, climate, land forms, and oceans; rivers, lakes, and waterpowers; ground water, and soils, mountains, plateaus, and plains, deserts, steppes, and prairies. Lectures, laboratory, and field work.

Second semester, given by Mr. Robinson: A study of economic and political development in relation to nature, exclusive of ethnography; meaning of the geographic and the economic interpretations of history; economic progress as a phase of adaption to environment, illustrated by reference to the industrial conditions of the leading countries. Text-book, supplemented by lectures and reports on special topics.

2b. Economic Geography Mr. ROBINSON

Three credits (three hours per week); second semester. Open to sophomores, juniors, and seniors except those who have admission credit in Commercial Geography. Course 2a may profitably precede or accompany Course 2b.

The economic basis of modern civilization; the causes, both in nature and man, which control the localization of industries, the geographic factor in American history and economic development; natural resources and the economic problem of their use and conservation; the principal extractive, manufacturing, and distributive industries of the United States, its outlying possessions, and the leading foreign countries, especially those which have a large prospective value as markets for American manufactures and as fields for the investment of American capital. Text-book with lectures and special reports.

3a. Modern Industrial and Commercial History of Europe Mr. GRAY

Three credits (three hours per week); first semester. Optional with modern languages in Agricultural and Home Economic Courses in freshman year.

The industrial and commercial development of the chief European countries since the middle of the 18th century, with special attention to Great Britain; the effects of mechanical invention and political change on industry and trade.

Course 3a requires no preliminary course and may be taken advantageously with Course 1 or Course 2a. (See Course 3b.) Given in 1912-13.

3b. Industrial and Commercial History of the United States Mr. GRAY

Three credits (three hours per week); second semester. Optional with modern languages in Agricultural and Home Economics courses in freshman year.

Courses 3a and 3b are conducted each with a text-book, supplemented by lectures and prescribed topical readings. In each of these courses, one written report of considerable length will be required each semester. Given in 1912-13.

4. Advanced Economics Mr. ROBINSON

Three credits (three hours per week); second semester. Open to those who have completed Course 1; required for a major in Economics and should be taken as soon as possible after Course 1.

An advanced course in economic theory, devoted chiefly to a study of recent theories of distribution. Assigned readings, reports, and discussions.

15. Business Organization Mr. Mitchell

Three credits (three hours per week); second semester. Open to those who have completed Course 1.

Forms of organization to effect business control; executive committees; the main departments of a business and the principles governing sub-departmentization and office organization of each. Based on Parson's *Business Administration*, with lectures, theses, and class discussions.

16. Principles of Accounting Mr. Mitchell

Three credits (three hours per week); first semester. Open to those who have completed Course 1.

Aims and essentials of a desirable system of accounts; tabular books and ledger systems; proper treatment of discounts, contingent liabilities, and anticipated losses; depreciation; expense classification; preparation and interpretation of revenue accounts, balance sheets, and other business statements. A laboratory course, supplemented by lectures.

21. Elements of Business Law Mr. Young

Two credits; course pursued the first semester until the Christmas recess. Open to those who have completed Course 1 or Political Science Course 1.

The principles of law governing ordinary commercial transactions, so much as every educated man ought to know for his guidance in every-day business affairs; the general law of contracts, bankruptcy, agency, sales, negotiable instruments, partnership, and corporations. Lectures, quizzes, and assigned readings.

22. Principles of Rural Economics Mr. Thompson

Three credits (three hours per week); second semester. Required of juniors in the Agricultural Course. Prerequisite, Economics 1.

Introductory survey of agricultural systems; comparison of rural and urban economy; a study of internal and external economics of agricultural industries, giving special attention to localization, marketing, land tenure, and credit; the social and political aspects of rural economy. Lectures, assigned readings, and written reports.

29. Seminar in the Economic Development of the Middle West Mr. Robinson

Three credits (three hours per week); second semester. Open to graduate students and to seniors who have credit in Economics 1 and 4. Courses 2b and 28 should also precede Course 29.

In 1912-13, members of the seminar will undertake original investigations relating to the development of various industries in the Middle West. In alternate years, attention will be given to the development of tax systems and present problems in taxation, viewed as functions of economic development. Reference reading, discussions, and thesis work.

33. Seminar in Agricultural Economics Mr. Thompson

Six credits (three hours per week); both semesters. Open to graduate students and to seniors who have completed Courses 1 and 22.

Research problems in the marketing and distribution of farm products, agricultural credit, farm ownership and tenacy, and agricultural organizations.

EDUCATION

COLLEGE OF EDUCATION

George F. James, Ph.D., Professor, Head of Department of Education
125 Folwell Hall
Fletcher H. Swift, Ph.D., Professor 300 Folwell Hall

Course 1b in Psychology and twelve additional credits in Education are required for the University Teacher's Certificate. Additional work in Education may be elected from other courses announced by that College.

1. History of Education Mr. Swift

Three credits (three hours per week); first semester. Open to juniors and seniors.

An introductory study in the history of education conducted by means of lectures, assigned readings, discussions, and reports. The purpose of the course is to arouse an interest in educational problems, to secure some perspective for use in current investigations, with some command of the facts of educational history, and some ease in the methods of historical study. An attempt is made to bring out education as one phase of civilization and to show the connection of schools with other social institutions. Attention will be given especially to an examination of the schools of Greece and of Rome, the education of the early Christian centuries, the development of different types of schools in medieval times, the rise of the university and of the humanistic schools of the Renaissance.

A somewhat intensive study of the periods in the history of modern education, with special reference to the development of the various national systems of public instruction. Different types of educational theory are considered in connection with a study of the men who first advanced them, and of the schools in which they were first put into effect. This course is a direct preparation for an understanding of the educational systems, theories, and practices of the present.

FORESTRY

COLLEGE OF FORESTRY

Edward G. Cheyney, B.A., Professor of Forestry, Chief of Division
3 1st fl. Horticulture Bldg.

10. Farm Forestry Mr. Cheyney

Three credits (three hours per week); first semester. Required of juniors specializing in Horticulture.

This course is designed to give a general definition of Forestry in its different branches, and in its relation to Agriculture. It takes up in detail the information, care, and utilization of the woodlot, the planting and influence of windbreaks, the preservation of timber, and the principles which should underlie the selection of species and arrangement in ornamental planting around the homestead. Lectures, recitations, and reference reading.

FRENCH

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Charles W. Benton, Litt.D., Professor, Head of Department of Romance Languages 200 Folwell Hall
Rene M. Delamare, B.L., Instructor

1. Beginning French Mr. Delamare

Six credits (three hours per week); both semesters. Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester; not credited toward a minor in French.

Thieme and Effinger, French Grammar and Reader; modern texts.

2. Intermediate French Mr. Delamare

Six credits (three hours per week); both semesters. Open to sophomores, juniors, and seniors who have completed Course 1. Both semesters must be completed before credit is given for the first semester.

François, Advanced French Prose Composition; modern texts will be read, including some of the works of Coppée, Mérimée, Daudet, Scribe, etc.

3. Scientific French Mr. Delamare

Six credits (three hours per week); both semesters. Open to those who have completed Courses 1 and 2.

This course is designed to acquaint students with French scientific journals.

GEOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

William H. Emmons, Ph.D., Professor, Head of Department of Geology and Mineralogy	108 Pillsbury Hall
Edward M. Lehnerts, M.A., Assistant Professor	107 Pillsbury Hall
Frank F. Grout, M.S., Assistant Professor	102 Pillsbury Hall
A. Walfred Johnston, M.A., Instructor	112 Pillsbury Hall

1a. General Geology Messrs. Emmons and Johnston

Three credits (three hours per week); first semester. Open to sophomores, juniors, and seniors. The class is divided in four sections. High-school or college Chemistry is a desirable antecedent, but is a prerequisite for one section only.

A synoptical treatment of the materials of the earth and of geologic processes; physiographic, structural, and dynamic geology, with a brief introduction to historical geology. Lectures, laboratory, field excursions, map study, and conferences.

2. Physiography Mr. Lehnerts

Three credits (three hours per week); first semester. Open to freshmen.

This course is designed for the students in Agricultural and Forestry Courses; and the work includes: (1) the fundamental facts and principles of mathematical and physical geography and their relation to human industries; (2) minerals, rocks, and building stones; (3) ground and surface waters; (4) physiographic regions of the United States; (5) natural resources, their utilization and conservation; (6) map studies; (7) local field work; and (8) practical problems. Text-books, lectures, and reference reading.

3. Industrial Geography Mr. Lehnerts

Three credits (three hours per week); second semester. Open to students who have completed Course 1a.

The structural features of the North American continent outlined as an introduction. Following this is a study of the types of soil and dominant climatic characters of the several agricultural regions of the continent; a discussion of the geography of industries as they have grown up within the past 100 years and their dependence upon physiographic conditions; a study of local industries effected through excursions and reports. A brief survey of industries in other parts of the world parallels the more detailed study of North America. Throughout the course cause and effect are kept in view.

4. Elements of Meteorology — Mr. Lehnerts

Three credits (three hours per week); second semester. Open to juniors and seniors who have completed Courses 1a or 2.

The general principles of meteorology are treated, embracing properties and phenomena of the atmosphere, including an explanation of the ordinary observations of pressure and temperature, together with a more extended study of the apparatus and practice of a weather bureau office. This is followed by a study of storms and climatic elements generally. The conditions of climatic changes are studied and the influence of physiographic conditions are discussed. Text-books, lectures, and reference reading.

5. Geography and Geology of Minnesota — Mr. Johnston

Three credits (three hours per week); second semester. Open to students who have completed Course 1a.

The physical geography of the State in its relations to geological history and industrial development; the principles and facts of pre-Cambrian geology as exemplified in the State and the extension of these into general application; the present problems of the State in agriculture, drainage, water-power, mining, quarrying, etc.

6. Elements of Mineralogy — Messrs. Bowles and Grout

Three credits (six hours per week); second semester. Open to freshmen, sophomores, juniors, and seniors who have taken high-school Chemistry or are taking college Chemistry.

The systems of crystallization; the morphological, physical, and chemical characters of minerals; classification and description of common minerals; the occurrence, genesis, and use of minerals. Laboratory work, involving the application of chemical and blowpipe tests to the identification of species; determination of minerals by physical properties and sight identifications.

GERMAN

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

John G. Moore, B.A., Professor, Head of Department of German	210 Folwell Hall
Richard Wischkaemper, M.A., Instructor	216 Folwell Hall
Leon Metzinger, Ph.B., Instructor	211 Folwell Hall
J. Theodore Geissendoerfer, B.A., Instructor	216 Folwell Hall

1. Beginning — Mr. Metzinger

Six credits (three hours per week); both semesters. Open to all who do not present German for entrance.

Pronunciation, grammar, conversation, and composition; selected reading in easy prose and verse.

2. Intermediate — Mr. Metzinger

Six credits (three hours per week); both semesters. Prerequisite, Course 1 or one year of entrance German.

Reading of selections of easy modern prose such as Arnold's *Fritz auf Ferien* or Seidel's *Leberecht Huehnchen.* Students in Agriculture and Forestry will read some scientific text in the second semester.

3b. Scientific Intermediate Messrs. METZINGER and GEISSENDOERFER
Six credits (three hours per week); both semesters. Prerequisite, Course 1.

This course is arranged to meet the peculiar needs of students of this College. Text, Hodges' *Scientific German.*

4. Prose and Poetry Mr. METZINGER
Six credits (three hours per week); both semesters. Open to all who enter the University with two years of German.

Selections of prose and poetry, geography, history, and legend; review of grammar throughout the year.

5. Elementary Conversation and Composition Mr. GEISSENDOERFER
Four credits (two hours per week); both semesters. Open to those who are taking or have taken Course 2 or 3 or 4. Both semesters must be completed before credit is given for the first semester.

Translation of short English selections; conversation on topics of every-day life; narrative and descriptive essays and letter-writing.

6. Drama Mr. METZINGER
Six credits (three hours per week). Prerequisite, Course 4 or its equivalent.

Lectures and readings on the lives and works of Goethe and Schiller. Critical reading of one or more of the later dramas of each. Lectures on, and readings in, Hebbel, Hauptmann, and Sudermann.

7. Advanced Scientific Reading Messrs. METZINGER and WISCHKAEMPER
Six credits (three hours per week); both semesters. Prerequisite, Course 3 or 4.

Reading of scientific monographs and periodicals on subjects in which the class is working or is interested.

PHILOSOPHY AND PSYCHOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

NORMAN WILDE, Ph.D., Professor, Head of Department of Philosophy and Psychology	323 Folwell Hall
JAMES BURT MINER, Ph.D., Assistant Professor	317 Folwell Hall
DAVID F. SWENSON, B.S., Assistant Professor	320 Folwell Hall

1a. General Psychology Messrs. MINER, SWENSON, and WOODROW
Six credits (three hours per week); both semesters. Open to sophomores, juniors, and seniors. This course is strongly advised as an introduction for all who can give a year to the subject. Either 1a or 1b is

required for the teacher's certificate. Both semesters must be completed before credit is given for the first semester.

The aims and methods of psychology, the facts and laws of mental life and the functions of the various mental processes in the adjustment of man and his environment; the study of mental development and the learning process in relation to training and instinct.

1b. Elements of Psychology Mr. SWENSON

Three credits (three hours per week); each semester. Open to sophomores, juniors, and seniors.

For those who do not expect to take further work in psychology, but wish a brief outline of the subject, either as preparatory for work in philosophy or as part of their general education. The significance of mental facts for the problems of philosophy will be noted.

2. Logic Messrs. WILDE and SWENSON

Three credits (three hours per week); each semester. Open to sophomores, juniors, and seniors.

The nature of knowledge, the laws of reasoning, and the principles and methods of scientific proof. The aim of the course is to produce accuracy of thought as well as to familiarize the student with the logical grounds of modern science. Text-book, lectures, and reports.

11. Ethics Mr. WILDE

Three credits (three hours per week); each semester. Open to sophomores, juniors, and seniors who have completed Course 1a or 1b or Course 2.

An introductory study of the principles of morals. Sketch of the historical development of morality followed by an analysis of its meaning, showing the elements in human nature upon which it is based and the ground of its authority; the nature of goodness, the authority of conscience, moral knowledge, duty and responsibility; the application of moral principles to certain unsettled problems of moral life.

PHYSICS

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

JOHN ZELENY, Ph.D., Professor, Head of Department of Physics	15 Physics Bldg.
ANTHONY ZELENY, Ph.D., Professor	20 Physics Bldg.
JAMES C. SANDERSON, Ph.D., Instructor	32 Physics Bldg.

1. General Physics Messrs. ANTHONY ZELENY and SANDERSON

Three credits (three hours per week); first semester. Open to freshmen; may be taken separately or in conjunction with Course 2.

Mechanics of solids and fluids, heat and sound. The first part of an elementary course for those who do not intend to pursue the subject longer than one year; experimental rather than mathematical; the fundamental principles. One experimental lecture and two recitations each week.

2. General Laboratory Practice Messrs. ERIKSON and SANDERSON

One credit (two hours per week); first semester. Open to freshmen who have completed or are taking Course 1.

Physical measurements in the mechanics of solids and fluids, and in heat and sound, giving the student a knowledge of experimental methods.

3. General Physics Messrs. Anthony Zeleny and Sanderson

Three credits (three hours per week); second semester. Open to freshmen who have completed Course 1; may be taken separately or in conjunction with Course 4.

Light, electricity, and magnetism. The second part of the elementary course; the treatment experimental; the fundamental principles, including those of radioactivity, ionization, X radiation, and the electrical constitution of matter. One experimental lecture and two recitations each week.

4. General Laboratory Practice Messrs. Erikson and Sanderson

One credit (two hours per week); second semester. Open to freshmen who have completed or are taking Course 3.

Physical measurements in light, electricity, and magnetism, giving the student a knowledge of experimental methods.

ZOOLOGY

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Henry F. Nachtrieb, B.S., Professor, Head of Department of Animal Biology	205 Pillsbury Hall
Charles P. Sigerfoos, Ph.D., Professor	201 Pillsbury Hall
Oscar W. Oestlund, Ph.D., Assistant Professor	220 Pillsbury Hall
Hal Downey, Ph.D., Assistant Professor	203 Pillsbury Hall
Charles E. Johnson, M.A., Instructor	2 Pillsbury Hall

1. General Zoology Messrs. Nachtrieb and Sigerfoos

Six credits (six hours per week); both semesters. Required of sophomores in Agricultural Course.

A general survey of the animal kingdom aiming at an appreciation of the principles of organization, physiology, and development of animals. In the laboratory representatives of the chief branches of the animal kingdom are studied in detail and three or four weeks are devoted to a study of the development of the chick and some invertebrates. Lectures, quizzes, and laboratory work.

2. Essentials of Histology and Embryology Mr. Downey

Six credits (six hours per week); both semesters. Elective. Prerequisite, Zool. 1.

In this course are taken up the development and minute structure of the animal as an organism built up of tissue combined into organs, and the student is given practice in general methods, technique, and the use of apparatus. The course prepares directly for most of the advanced courses. Lectures, quizzes, and laboratory work.

4. General Physiology Mr. Nachtrieb

Six credits (three hours per week); both semesters. Required of seniors in Dairy and Animal Husbandry Course. Elective for juniors in Home Economics Course. Prerequisite, Zool. 1.

In the first semester are considered the physical, structural, and functional features of living substance; the cell, present conditions, and expressions of life; and the theories of the origin of life and death. Demonstrations and simple experiments constitute an essential part of the course in both semesters.

In the second semester the life of the cell is considered in its relation to that of other cells and the course is concluded with special reference to the teaching of physiology in high schools.

5. Comparative Anatomy of Vertebrates — Mr. JOHNSON

Six credits (six hours per week); both semesters. Elective. Open to juniors and seniors. Prerequisite, Zool. 1 or its equivalent.

The first semester's work is based upon a study of chordates, cartilaginous and bony fishes and all classes up to mammalia; the second semester to a detailed study of the cat and comparative studies of the rabbit, sheep, and man. Lectures, quizzes, and laboratory work. Required text-books. Davidson's *Mammalian Anatomy* and Burkholder's *Anatomy of the Brain.*

12. Parasitology — Mr. NACHTRIEB

Three credits (six hours per week); second semester. Open to those who have completed Course 1.

Can be combined with Course 10 for a year course. Reference and laboratory work on animal parasites, their structure, habits, life-histories, and economic importance.

14. Ornithology — Mr. JOHNSON

Three credits (six hours per week); second semester. Open to those who have completed Course 1.

Lectures, quizzes, laboratory, and field work on the structure, classification, nest building, food, habits, and distinction of birds; migration, coloration, flight, etc.; practical demonstrations of the preparation of birds and eggs for scientific purposes. Required: Chapman's *Handbook of Birds of Eastern North America.*

19. Zoology — Mr. NACHTRIEB and ASSISTANTS

Three credits (six hours per week); second semester. A general course for students in Home Economics Course.

STUDENTS

GRADUATE STUDENTS—11

Cavert, William L., St. Paul
Conzet, Grover M., Nevis
Corneia, Francis A., Plato
Frear, D. W., Fort Collins, Col.
Harlan, Harry V., Washington, D. C.
Hungerford, De Forest, St. Paul
Peck, Francis W., St. Paul
Shiflett, Roger, St. Paul
Stakman, Elvin C., St. Paul
Stallard, Harvey, Onaga, Kan.
Walker, George W., Minneapolis

AGRICULTURE

SENIORS—22

Anderson, Arthur K., Montevideo
Bryan, William J., Red Wing, R. 2
Bullock, Benjamin F., Bricks, N. C.
Carpenter, Fred B., Sleepy Eye, R. 5
Dahlberg, Robert C., Fergus Falls
Dvoracek, Daniel C., Glencoe
Fitzpatrick, Guy, 4200 Piney Branch Road, Washington, D. C.
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